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Record of Decision:

SYDNEY MINE SLUDGE PONDS
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BRANDON, FL
09/29/1989

SYDNEY MINE SLUDGE PONDS
HILLSBOROUGH COUNTY, FLORIDA

STATEMENT OF BASIS AND PURPOSE

THIS DECISION DOCUMENT PRESENTS THE SELECTED REMEDIAL ACTION FOR THE SYDNEY MINE SLUDGE PONDS SITE IN HILLSBOROUGH COUNTY, FLORIDA, DEVELOPED IN ACCORDANCE WITH THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980 (CERCLA), AS AMENDED BY THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (SARA), AND, TO THE EXTENT PRACTICABLE, THE NATIONAL OIL AND HAZARDOUS SUBSTANCES POLLUTION CONTINGENCY PLAN (NCP). THIS DECISION DOCUMENT EXPLAINS THE FACTUAL AND LEGAL BASIS FOR SELECTING THE REMEDY FOR THE SITE.

THE STATE OF FLORIDA HAS CONCURRED ON THE SELECTED REMEDY. THE INFORMATION SUPPORTING THIS REMEDIAL ACTION DECISION IS CONTAINED IN THE ADMINISTRATIVE RECORD FOR THIS SITE.

ASSESSMENT OF THE SITE

ACTUAL OR THREATENED RELEASES OF HAZARDOUS SUBSTANCES FROM THIS SIT, IF NOT ADDRESSED BY IMPLEMENTING THE RESPONSE ACTION SELECTED IN THIS RECORD OF DECISION (ROD), MAY PRESENT AN UNACCEPTABLE RISK TO PUBLIC HEALTH, WELFARE, OR THE ENVIRONMENT.

DECLARATION

THE SELECTED REMEDY IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT, COMPLIES WITH FEDERAL AND STATE REQUIREMENTS THAT ARE LEGALLY APPLICABLE OR RELEVANT AND APPROPRIATE TO THE REMEDIAL ACTION, AND IS COST-EFFECTIVE. A WAIVER CAN BE JUSTIFIED FOR ANY FEDERAL AND STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS THAT WILL NOT BE MET. THIS REMEDY UTILIZES PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES, TO THE MAXIMUM EXTENT PRACTICABLE, AND IT SATISFIES THE STATUTORY PREFERENCE FOR REMEDIES THAT EMPLOY TREATMENT THAT REDUCE TOXICITY, MOBILITY, OR VOLUME AS THEIR PRINCIPAL ELEMENT.

BECAUSE THIS REMEDY MAY RESULT IN HAZARDOUS SUBSTANCES REMAINING ON-SITE ABOVE HEALTH-BASED LEVELS, THE FIVE-YEAR FACILITY REVIEW WILL APPLY TO THIS ACTION.

9/29/89 GREER C. TIDWELL
DATE EPA REGIONAL ADMINISTRATOR

INTRODUCTION

THE SYDNEY MINE SLUDGE PONDS SITE (SYDNEY) WAS PROPOSED FOR INCLUSION ON THE NATIONAL PRIORITIES LIST (NPL) IN JUNE 1986. VOLUNTARY REMEDIAL ACTIVITIES WITH STATE OVERSIGHT HAVE BEEN CONDUCTED BY THE HILLSBOROUGH COUNTY DEPARTMENT OF PUBLIC UTILITIES AT THE SITE. ONGOING REMEDIAL ACTIVITIES ARE PRESENTLY BEING PERFORMED BY OTHER RESPONSIBLE PARTIES. ON SEPTEMBER 6, 1989, THE PROPOSED PLAN, WHICH OUTLINES THE REMEDIAL ACTION ALTERNATIVES AND THE PREFERRED ALTERNATIVE, WAS ISSUED TO THE PUBLIC.

1.1 SCOPE AND ROLE OF FINAL OPERABLE UNIT

THE ACTIVITIES AT THE SYDNEY SITE WILL BE TREATED AS ONE FINAL OPERABLE UNIT FOR REMEDIATION OF

THE GROUND WATER. A REMEDY FOR THE GROUND WATER IS BEING PROPOSED IN ORDER TO PROTECT PUBLIC HEALTH AND THE ENVIRONMENT BY CONTROLLING POTENTIAL MIGRATION OF CONTAMINATED GROUND WATER TO THE HAWTHORN FORMATION. THE HAWTHORN FORMATION SERVES AS A LOCAL DRINKING WATER SUPPLY.

THIS RECORD OF DECISION (ROD) HAS BEEN PREPARED TO SUMMARIZE THE REMEDIAL ALTERNATIVE SELECTION PROCESS AND TO PRESENT THE SELECTED REMEDIAL ALTERNATIVE FOR THE SITE.

SITE NAME, LOCATION AND DESCRIPTION

THE SYDNEY MINE SLUDGE PONDS SITE IN HILLSBOROUGH COUNTY, FLORIDA, OCCUPIES 9.5 ACRES OF A 1,700-ACRE FORMER PHOSPHATE MINING SITE. THE SITE WAS STRIP-MINED FOR PHOSPHATE ROCK IN THE 1930S AND 1950S. (SEE FIGURE 2.1 AND 2.2). IT IS LOCATED 15 MILES SOUTHEAST OF DOWNTOWN TAMPA IN THE UNINCORPORATED COMMUNITY OF BRANDON.

SITE HISTORY

FROM 1973 TO 1982, THE HILLSBOROUGH COUNTY PUBLIC UTILITIES DEPARTMENT RENTED THE SYDNEY SITE FOR DUMPING SEPTIC WASTES, WASTE AUTOMOTIVE OILS, GREASE TRAP WASTES, AND MANUFACTURING CUTTING OILS. DURING THIS PERIOD, THE PROPERTY WAS OWNED BY THE AMERICAN CYANAMID CORPORATION.

IN 1981, THE PROPERTY WAS PURCHASED BY THE CURRENT OWNER, WASTE MANAGEMENT, INC. DURING THE EIGHT-YEAR SPAN OF WASTE DISPOSAL OPERATIONS, AN ESTIMATED 16 MILLION GALLONS OF WASTE WERE DEPOSITED IN THREE SMALL PITS. (SEE FIGURE 2.2) . THESE WASTES WERE TRANSPORTED TO THE SITE BY VARIOUS HAULERS SERVING HOMES, SCHOOLS, HOSPITALS, AND MANUFACTURING AND COMMERCIAL ESTABLISHMENTS IN THE TAMPA BAY REGION.

IN 1978 THE SYDNEY SLUDGE AND OIL PITS BECAME THE FOCUS OF COMMUNITY ATTENTION WHEN THE COUNTY CONSIDERED USING OTHER PHOSPHATE MINING PROPERTY FOR A SOLID WASTE LANDFILL, A PROPOSAL COUNTY LATER REJECTED. THE FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION (FDER) GRANTED A CONSTRUCTION PERMIT FOR THE EXISTING WASTE DISPOSAL ACTIVITIES IN 1979, AND AN OPERATING PERMIT THE FOLLOWING YEAR. ALSO IN 1979 FDER AND EPA INCLUDED THE SITE IN THEIR INVENTORIES OF POTENTIAL HAZARDOUS WASTE SITES IN FLORIDA.

AS A RESULT OF THE SITES INCLUSION IN THESE INVENTORIES, EPA'S AIR AND HAZARDOUS MATERIALS DIVISION CONDUCTED A SURFACE WATER AND GROUND WATER INVESTIGATION OF THE SITE DURING OCTOBER AND NOVEMBER 1979. THE SAMPLING PROGRAM CARRIED OUT AT THAT TIME DETERMINED THAT POTABLE WELLS IN THE VICINITY DID NOT CONTAIN ORGANIC COMPOUNDS ABOVE DETECTION LEVELS OR HEAVY METALS ABOVE BACKGROUND LEVELS. HOWEVER, MONITORING WELLS NEAR THE SLUDGE AND OIL PITS CONTAINED BOTH TYPES OF SAMPLES FROM TURKEY CREEK WHICH FLOWS THROUGH THE FORMER PHOSPHATE MINE ABOUT A MILE EAST OF THE FORMER WASTE DISPOSAL PITS. THE SEDIMENTS UPSTREAM AND DOWNSTREAM FROM THE SITE EXHIBITED ELEVATED LEVELS OF METALS. SUBSEQUENT TO THESE FINDINGS, FDER BEGAN MONITORING THE SITE.

IN LATE 1980, THE HILLSBOROUGH COUNTY DIVISION OF PUBLIC UTILITIES NOTIFIED EPA OF HAZARDOUS WASTE ACTIVITY AT THE SITE IN ACCORDANCE WITH THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) NOTIFICATION REQUIREMENTS. IN 1981, EPA FURTHER INVESTIGATED AND EVALUATED SITE CONDITIONS IN RESPONSE TO LOCAL CITIZENS' INQUIRES ABOUT AIR AND WATER QUALITY, AND HUMAN HEALTH EFFECTS. IN SEPTEMBER 1981, FDER DENIED ISSUANCE OF A SECOND OPERATION PERMIT. DURING THAT SAME MONTH, THE SITE WAS CLOSED TO DISPOSAL ACTIVITIES.

3.1 VOLUNTARY REMEDIAL ACTION

IN 1982, HILLSBOROUGH COUNTY OFFICIALS, CONSULTING WITH FDER, INVESTIGATED PLANS TO REMOVE

CONTAMINATION AND RESTORE THE PROPERTY. THE COUNTY CONTRACTED AN ENVIRONMENTAL CONSULTING FIRM, CH2M HILL, TO STUDY THE SITE AND EVALUATE CLOSURE AND RESTORATION OPTIONS. CH2M HILL DRILLED A SERIES OF TEST WELLS AND CONDUCTED A SAMPLING AND ANALYSIS PROGRAM TO DETERMINE THE TYPES, LOCATION, AND CONCENTRATIONS OF CONTAMINANTS.

USING THIS DATA, CH2M HILL EVALUATED SEVERAL TECHNOLOGIES FOR TREATING THE WASTES INCLUDING GROUND WATER TREATMENT, CHEMICAL, PHYSICAL, AND BIOLOGICAL TREATMENT, THERMAL DESTRUCTION, AND ON-SITE CONTAMINANT AND DISPOSAL. CH2M HILL REPORTED ITS FINDINGS TO THE COUNTY IN 1983. OF THE OPTIONS CONSIDERED, THE COUNTY SELECTED GROUND WATER EXTRACTION AND TREATMENT, WITH EXCAVATION AND ON-SITE INCINERATION OF THE PIT CONTENTS AS THE MOST APPROPRIATE METHOD TO REMEDY SITE CONTAMINATION.

ALSO IN 1983, THE COUNTY APPLIED TO FDER TO APPROVE A GROUND WATER MONITORING PLAN TO MEET NEW STATE GROUND WATER REGULATIONS, AND CH2M HILL EXAMINED THE POTENTIAL FOR PERFORMING THE CLEANUP UNDER THE FEDERAL EPA SUPERFUND PROGRAM. THE COUNTY CONTINUED ACTIVITY UNDER STATE GUIDANCE.

IN 1984, THE COUNTY AND STATE PROCEEDED WITH THE APPLICATION PROCESS AND THE COMMENCEMENT OF THE CLEANUP ACTIVITIES. IN WHAT LATER BECAME A TWO-PHASED EFFORT, THE ACTIVITIES IN THIS FIRST PHASE (PHASE I) INCLUDED:

* CONSTRUCTION OF A SLURRY WALL TO CONTAIN THE WASTE PIT CONTENTS

* EXCAVATION AND ON-SITE INCINERATION OF APPROXIMATELY 10,900 CUBIC YARDS OF DISPOSAL POND WASTES IN A MOBILE INCINERATOR

* PUMPING OVER 40 MILLION GALLONS OF CONTAMINATED GROUND WATER IN THE VICINITY OF THE PITS AND TREATING IT IN AN AIR-STRIPPING TOWER ON THE SITE. THE AIR-STRIPPER USES A FORCED AIR AND WATER PROCESS TO REMOVE THE CONTAMINANTS FROM THE WATER WHICH IS THEN SPRAY IRRIGATED ON LAND ADJACENT TO THE WASTE DISPOSAL SITE.

INSTALLATION OF THE SLURRY WALL AND GROUND WATER EXTRACTION WELLS WAS COMPLETED BY THE END OF 1984. EXCAVATION AND INCINERATION OF THE WASTE PIT MATERIALS BEGAN IN FEBRUARY 1985 AND CONTINUED THROUGH 1986. DURING THIS PERIOD, CLEANUP CONTRACTORS UNCOVERED ADDITIONAL CONTAMINANTS BURIED ADJACENT TO ONE OF THE PITS. WHILE STUDYING THE SITE FOR OTHER AREAS OF CONTAMINATION, CONTRACTORS FOUND SEVERAL SPOTS ADJACENT TO THE PITS AND EVALUATED OPTIONS FOR ADDRESSING THE ADDITIONAL CONTAMINATION.

AS A RESULT OF THE STUDIES, IN THE SPRING OF 1986, THE COUNTY SELECTED EXCAVATION AND ON-SITE LAND TREATMENT (AIR-DRYING) AND OFF-SITE DISPOSAL OF RESIDUALS AT AN APPROVED SOLID WASTE LANDFILL. THIS ACTION WAS CONDUCTED IN A SECOND PHASE (PHASE II) OF THE SITE CLEANUP.

CH2M HILL INITIATED THE ACTUAL PHASE II SITE WORK IN JANUARY 1987 AND COMPLETED IT IN AUGUST 1987. DURING THIS PHASE, APPROXIMATELY 15,000 CUBIC YARDS OF CONTAMINATED MATERIALS WERE EXCAVATED FROM THE SITE AND MOVED TO THE AIR-DRYING AREA. ALL MATERIALS TREATED BY THIS METHOD WERE REMOVED BY AUGUST 25, 1987.

IN SUMMARY, DURING THE FIRST FOUR YEARS OF THE SITE CLEANUP, APPROXIMATELY 25,000 CUBIC YARDS OF CONTAMINATED SOILS WERE EXCAVATED, TREATED, AND REMOVED FROM THE SITE. THE GROUND WATER EXTRACTION AND TREATMENT OPERATION IS CONTINUING WITH GROUND WATER BEING PUMPED FROM 71 WELLS (40 SLURRY WALL WELLS, 13 NORTH DIKE WELLS, 6 SPOIL ROW WELLS, AND 12 OIL POND RECOVERY WELLS). OVER 100 MILLION GALLONS OF CONTAMINATED GROUND WATER HAVE BEEN EXTRACTED AND TREATED SINCE THE OPERATION BEGAN.

3.2 HRS/NPL LISTING HISTORY

IN 1982, EPA EVALUATED INFORMATION ON THE SITE USING THE HAZARD RANKING SYSTEM (HRS). VOLATILE ORGANIC COMPOUNDS INCLUDING TOLUENE, BENZENE, METHYLENE CHLORIDE, 1,1-DICHLOROETHANE, AND TRANS-1,2-DICHLOROETHANE WERE DETECTED AT ELEVATED LEVELS. THE NEED TO PROTECT GROUND WATER QUALIFIED THE SITE FOR THE NATIONAL PRIORITIES LIST (NPL) ALTHOUGH IT WAS NOT ADDED TO THE LIST AT THAT TIME.

IN 1985, EPA REACTIVATED THE SUPERFUND HRS AT THE SYDNEY SITE IN RESPONSE TO CONGRESSIONAL CONCERN ABOUT A NUMBER OF SITES THAT HAD SCORED HIGH ENOUGH TO BE ADDED, BUT WERE NOT ADDED TO THE NPL. EPA'S UPDATED HRS SITE INVESTIGATION SHOWED CONTAMINANTS AT ELEVATED LEVELS IN AN UPPER OR "PERCHED" WATER TABLE THAT HAD BEEN CREATED BENEATH THE FORMER PITS DURING PHOSPHATE MINING ACTIVITIES. THE PERCHED WATER TABLE DOES NOT CURRENTLY SERVE AS A DRINKING WATER SUPPLY. FOLLOWING THIS INVESTIGATION, EPA PROPOSED THE SITE FOR THE NPL IN JUNE 1986. COUNTY AND STATE OFFICIALS OBJECTED TO EPA'S POLICY HAS ALWAYS BEEN THAT VOLUNTARY HAZARDOUS WASTE MITIGATION ACTIVITIES DO NOT PRECLUDE THE AGENCY'S LISTING THE SITE. SINCE THE SYDNEY SITE WAS PROPOSED FOR THE NPL, THE COUNTY, FDER, AND EPA HAVE CONTINUED COORDINATION ON ACTIONS NECESSARY TO SATISFY PROVISIONS OF CERCLA.

3.3 RI/FS HISTORY

IN 1988 AND 1989, EPA REVIEWED THE STUDIES AND ACTIONS PREVIOUSLY CONDUCTED AT THE SITE. THE PURPOSE OF THE REVIEW WAS TO DETERMINE IF THE ACCUMULATED INFORMATION SATISFIED THE REQUIREMENTS OF A REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) AS STIPULATED UNDER THE NATIONAL CONTINGENCY PLAN.

EPA ALSO CONDUCTED A SEARCH TO IDENTIFY POTENTIALLY RESPONSIBLE PARTIES (PRPS), THAT IS PERSONS OR COMPANIES WHO OWNED, USED, OR TRANSPORTED WASTES TO THE SITE AND THEREFORE MAY HAVE CONTRIBUTED TO THE CONTAMINATION PROBLEM.

EPA'S 1988-1989 REVIEW IDENTIFIED THE NEED FOR AN EXPANSION OF THE SUBSURFACE INVESTIGATION TO DEFINE MORE CLOSELY THE EXTENT OF GROUND WATER CONTAMINATION. IT ALSO DEMONSTRATED THE NEED TO INSTALL AT LEAST TWO MORE GROUND WATER MONITORING WELLS IN ORDER TO CHECK FOR POTENTIAL MIGRATION OF CONTAMINANTS FROM BENEATH THE NORTH POND, ONE OF THE FORMER WASTE PITS. EPA ALSO REQUIRED A RISK OR ENDANGERMENT ASSESSMENT (EA) WHICH ANALYSES THE POTENTIAL THREAT TO HUMAN HEALTH AND THE ENVIRONMENT IF NO ACTION WERE TAKEN TO ADDRESS THE CONTAMINATION AT THE SITE. HOWEVER, SINCE ACTIONS HAVE ALREADY BEEN TAKEN AT THE SYDNEY SITE, THE POTENTIAL THREAT TO HUMAN HEALTH AND THE ENVIRONMENT WOULD OCCUR IF THE PRESENT ACTIONS WERE DISCONTINUED. ADDITIONALLY, RISK ASSESSMENTS EVALUATE THE DEGREE OF HARMFULNESS (TOXICITY) OF WHATEVER CONTAMINANTS ARE PRESENT. THEY ALSO CHARACTERIZE THE KIND OF RISKS THAT MIGHT EXIST FOR HUMAN OR OTHER ENVIRONMENTAL COMMUNITIES IS EXPOSED TO CONTAMINANTS. EXPOSURE PATHWAYS (FOR EXAMPLE, CONTACT WITH AIR, WATER, OR DIRECT CONTACT WITH THE (WASTE) ALSO ARE IDENTIFIED IN RISK ASSESSMENTS.

EPA HAS DETERMINED THAT THE ADDITIONAL FIELD SAMPLING DATA AND ENDANGERMENT ASSESSMENT GENERATED BY HILLSBOROUGH COUNTY COMPLETES AN EVALUATION AND REMEDY SELECTION PROCESS WHICH CONSTITUTES THE SUPERFUND REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS). THIS APPROACH IS CONSISTENT WITH CURRENT POLICY CONCERNING REMEDY SELECTION FOR GROUND WATER PUMP AND TREATMENT SYSTEMS. EPA USED THE ADDITIONAL EA, ANALYTICAL DATA, AND SYSTEM PERFORMANCE DATA AVAILABLE TO DATE TO DECIDE ON FURTHER ACTIONS NEEDED AT THE SITE AS DESCRIBED IN THIS ROD.

3.4 ENFORCEMENT ACTIVITIES

AS RECOMMENDED, HILLSBOROUGH COUNTY HAS ADDITIONAL MONITORING WELLS AND HAS PREPARED AN EA BASED ON SAMPLING DATA GATHERED THROUGH THE SPRING OF 1989. THE COUNTY HAS SUCCEED IN SIGNIFICANTLY REDUCING THE LEVEL OF VOLATILE ORGANIC COMPOUNDS IN GROUND WATER ON THE SITE. AS A RESULT OF HILLSBOROUGH COUNTY'S ADDITIONAL WORK, EPA DETERMINED THAT THE RI/FS PROCESS REQUIREMENTS WERE

MET.

ON MAY 31, 1989, HILLSBOROUGH COUNTY CEASED OPERATING AND MAINTAINING THE EXISTING GROUND WATER RECOVERY AND TREATMENT SYSTEM AND TURNED THE SYSTEM OVER TO EPA. OPERATION AND MAINTENANCE OF THE SYSTEM WAS TURNED OVER TO OTHER PRPS THAT WERE ORDERED BY EPA TO CONTINUE THE OPERATION AND MAINTENANCE BEGUN BY THE COUNTY.

COMMUNITY RELATIONS

THIS RECORD OF DECISION PRESENTS THE SELECTED REMEDIAL ACTION FOR THE CONTAMINATED GROUND WATER AT THE SYDNEY SITE IN HILLSBOROUGH COUNTY, FLORIDA, CHOSEN IN ACCORDANCE WITH CERCLA, AS AMENDED BY SARA AND, TO THE EXTENT PRACTICABLE, THE NATIONAL CONTINGENCY PLAN. PRESENTATION OF THE SELECTED REMEDY TO THE PUBLIC HAS BEEN CONDUCTED IN ACCORDANCE WITH SECTION 117(A) OF CERCLA TO MEET THE PUBLIC PARTICIPATION RESPONSIBILITIES.

THE PROPOSED PLAN WAS RELEASED TO THE PUBLIC ON SEPTEMBER 6, 1989. THIS DOCUMENT WAS MADE PUBLIC IN BOTH THE ADMINISTRATIVE RECORD AND THE INFORMATION REPOSITORIES MAINTAINED AT THE EPA RECORDS CENTER IN ATLANTA, GEORGIA, AND AT THE BRANDON PUBLIC LIBRARY IN BRANDON, FLORIDA. THE NOTICE OF AVAILABILITY FOR THESE TWO DOCUMENTS WAS PUBLISHED IN THE TAMPA TRIBUNE ON SEPTEMBER 8, 1989. A PUBLIC COMMENT WAS ISSUED TO THE MEDIA ON SEPTEMBER 8, 1989 THROUGH SEPTEMBER 29, 1989. IN ADDITION A PUBLIC MEETING WAS HELD ON SEPTEMBER 13, 1989. AT THIS MEETING, REPRESENTATIVES FROM EPA ANSWERED QUESTIONS ABOUT THE SITE AND THE REMEDIAL ALTERNATIVES UNDER CONSIDERATION. A RESPONSE TO THE COMMENTS RECEIVED DURING THIS PERIOD IS INCLUDED IN THE RESPONSIVENESS SUMMARY, WHICH IS PART OF THIS RECORD OF DECISION.

SUMMARY OF SITE CHARACTERISTICS

5.1 PRE-MINING GEOLOGY

THE ORIGINAL TOPOGRAPHY OF THE AREA HAS BEEN SEVERELY DISRUPTED BY PHOSPHATE MINING. HOWEVER, A NUMBER OF INVESTIGATIONS WERE CONDUCTED ON THE SURFICIAL GEOLOGY PRIOR TO MINING. A BLANKET OF SURFICIAL SANDS COVERED MOST OF THE AREA PRIOR TO MINING. THESE PLEISTOCENE SANDS COVERED THROUGHOUT THE AREA EXCEPT ALONG THE STREAM CHANNELS AND WITHIN THE ASSOCIATED FLOODPLAINS. THE MAXIMUM THICKNESS OF THE SAND AT SYDNEY SITE WAS APPROXIMATELY THIRTY (30) FEET ON THE TOPOGRAPHICALLY HIGH AREA WTHIN THE MINE SITE. THIS SURFICIAL UNIT WAS GENERALLY COMPOSED OF LOOSE SANDS WITH SOME CEMENTED HARDPAN ZONES. THE WATER TABLE AQUIFER PRIOR TO MINING WAS CONTAINED WITHIN THIS UNIT. (SEE FIGURE 5.1)

UNDERLYING THE SURFICIAL SAND BLANKET WAS THE BONE VALLEY FORMATION. THIS UNIT OCCURRED THROUGHOUT THE SYDNEY SITE EXCEPT ALONG TURKEY CREEK WHERE THE UNIT HAS BEEN REMOVED BY STREAM EROSION. THE MAXIMUM THICKNESS OF THE BONE VALLEY FORMATION AT SYDNEY MINE WAS ESTIMATED AT THIRTY (30) FEET. IN GENERAL, THE BONE VALLEY FORMATION IS DIVIDED INTO UPPER AND LOWER UNITS. THE UPPER UNIT WAS GENERALLY A NON-PHOSPHATIC SANDY CLAY THAT WAS REMOVED DURING THE MINING OPERATION. THE LOWER UNIT, TERMED THE MATRIX BY THE PHOSPHATE INDUSTRY, WAS COMPOSED OF CLAYS AND SANDS WHICH WERE RICH IN PHOSPHATE ORE. THE PHOSPHATE IN THIS ZONE RANGED IN SIZE FROM FINE SAND GRAINS TO PEBBLES AS LARGE AS THREE-QUARTERS OF AN INCH IN DIAMETER. IN MANY AREAS, THE BASE OF THE ONE VALLEY FORMATION WAS MARKED BY THE OCCURRENCE OF A DEPOSIT OF COARSE PHOSPHATE PEBBLES.

THE HAWTHORN FORMATION UNDERLIES THE BONE VALLEY FORMATION THROUGHOUT MUCH OF THE AREA AND IS EXPOSED AT LAND SURFACE ALONG TURKEY CREEK AND IN MANY OF THE DEEPER DRAINAGE DITCHES ON THE PROPERTY. IN SOME AREAS, THE UPPER PART OF THE FORMATION WAS DISTURBED DURING MINING

OPERATIONS.

THE HAWTHORN FORMATION IS COMPOSED PRIMARILY OF CLAYS AND SANDY CLAYS THAT RANGE IN COLOR FROM BLUE-GREEN TO VERY LIGHT GRAY TO WHITE. PHOSPHATE GRAINS OCCUR RANDOMLY THROUGHOUT THE SECTION WITH FAIRLY HIGH CONCENTRATIONS IN SOME ZONES. SOME OF THE WHITE, CALCAREOUS CLAYS AND SANDY CLAYS ARE THE WEATHERED REMAINS OF LIMESTONE LAYERS. LIMESTONE LENSES ARE GENERALLY CREAM TO TAN AND SANDY CONTAINING VARYING AMOUNTS OF CLAY. SOME ZONES ARE VERY FOSSILIFEROUS. PRELIMINARY DATA INDICATE THAT THE AMOUNT OF THE LIMESTONE IN THE HAWTHORN INCREASES TO THE EAST.

5.2 INING HISTORY

PHOSPHATE MINING HAS OCCURRED DURING TWO PERIODS AT THE SYDNEY SITE. MINING FIRST TOOK PLACE DURING THE 1930S BUT CEASED PRIOR TO 1940. (SEE FIGURES 5.2 AND 5.3.) AMERICAN CYANAMID CORPORATION RESUMED MINING AT THE SITE IN THE 1950S. THE NORTH CLAY SETTLING POND GENERALLY OUTLINES THE EXTENT OF HE EARLY MINING ACTIVITY. INTENSIVE MINING OCCURRED SOUTH OF STATE ROAD 60 TO APPROXIMATELY 700 FEET NORTH OF THE EAST-WEST RETENTION DIKE WHICH SEPARATES THE NORTH AND SOUTH PONDS AND ABUTS THE NORTHERN END OF THE SYDNEY SITE. MINING CUTS IN THIS NORTH POND AREA WERE GENERALLY IN AN EAST-WEST DIRECTION.

OTHER AREAS WERE EXCAVATED BUT NOT COMPLETELY DISRUPTED. A DITCH HAS BEEN IDENTIFIED FROM EARLY AERIAL PHOTOGRAPHS THAT RAN WEST TO EAST BENEATH THE SYDNEY SITE. IT EXTENDED EASTWARD TO THE LIMITS OF THE SOUTH SLIMS POND AND THEN TURNED NORTHWARD INSIDE THE EASTERN RETENTION DIKE OF THE NORTH POND. THIS DEEP TRENCH MAY HAVE BEEN USED INITIALLY TO DEWATER THE PHOSPHATE MATRIX AND LATER AS A PROCESS WATER CIRCULATION DITCH.

THERE APPEARS TO HAVE BEEN LIMITED MINING ACTIVITY IN THE AREA IMMEDIATELY NORTHWEST OF THE SYDNEY SITE. THE TOPOGRAPHIC LOW IN THIS AREA WAS USED AS A PART OF THE WATER CIRCULATION SYSTEM.

AFTER MINING RESUMED IN 1950, THE NORTH POND (MINED IN THE 1930S) WAS CONVERTED INTO A CLAY WASTE SETTLING POND BY CONSTRUCTING A PERIMETER DIKE, ABOUT TWENTY (20) FEET HIGH, FROM OVERBURDEN SPOIL MATERIAL REMAINING FROM THE EARLIER MINING. IN SOME AREAS INSIDE THE DIKE, EXCAVATIONS WERE DEEPENED TO SUPPLY ADDITIONAL MATERIAL FOR DIKE CONSTRUCTION.

THE SOUTH SETTLING POND WAS MINED EARLY AFTER AMERICAN CYANAMID CORPORATION RESUMED OPERATIONS. EXCAVATIONS EXTENDED THROUGH THE SOUTHERN DIKE OF THE NORTH POND AND APPROXIMATELY 300 FEET NORTH INTO THE AREA MINED IN THE 1930S. THE DISPOSAL PITS WERE LOCATED ABOVE THE TWICE MINED/DISTURBED AREA. IT APPEARS, FROM AERIAL PHOTOGRAPHS, THAT THE EXTREME NORTHWESTERN CORNER OF THE SOUTH POND WAS NOT COMPLETELY MINED. THE DIRECTION OF MINING CUTS WAS PREDOMINANTLY NORTH-SOUTH IN THIS AREA.

FOLLOWING COMPLETION OF MINING OPERATIONS IN THE SOUTHERN AREA THE EXISTING DIKE WAS CONSTRUCTED SURROUNDING THE NORTH AND SOUTH PONDS. THIS RETENTION DIKE, APPROXIMATELY FORTY (40) FEET HIGH, WAS COMPOSED OF OVERBURDEN DISTURBED DURING MINING AND SOME CONSOLIDATED WASTE CLAYS FROM THE NORTH POND. THE RE-MINING AND THE CONSTRUCTION OF THIS DIKE DISRUPTED THE SLIME OVERLAPPING THE INSIDE DIKE FACE RELATIONSHIP THAT EXISTED ALONG THE SOUTHERN BOUNDARY OF THE NORTHERN SETTLING POND. ALONG UNDISTURBED DIKES, CLAY SLIMES OVERLAPPED PART OF THE INSIDE DIKE. THE SLIMES LAYER BEGAN AT APPROXIMATELY THE ELEVATION OF THE OLD WATER LEVEL AND THICKENED TOWARD THE DIKE BASE AND THE CENTER OF THE POND.

AFTER USE AS A SETTLING POND FOR A NUMBER OF YEARS, DURING WHICH A THICK LAYER OF PHOSPHATE SLIME WAS DEPOSITED, SAND TAILINGS WERE PUMPED ACROSS THE SURFACE OF BOTH THE NORTH AND SOUTH PONDS. THESE TAILINGS WERE THICKEST NEAR THE DISCHARGE POINT AND IN THE AREAS UNDERLAIN BY

OVERBURDEN MOUNDS. THE SANDS THINNED NEAR THE CENTERS OF THE PONDS AND IN AREAS WHERE DENSE VEGETATION EMERGED.

IN THE SOUTHERN PART OF THE NORTH POND, A LARGE AREA WAS FILLED WITH TAILING SANDS TO THE SAME ELEVATION AS THE HIGHER RETENTATION DIKE. THIS AREA OF SMOOTH, WELL-GRADED SAND WAS CONSTRUCTED TO PROVIDE A ROAD FOR A DRAGLINE TO CROSS TURKEY CREEK. DURING CONSTRUCTION OF THE DRAGLINE CROSSING, THE 20-FOOT HIGH DIKES ON THE EASTERN AND WESTERN SIDES OF THE NORTH POND APPEAR TO HAVE BEEN DISRUPTED WHERE THEY INTERSECT THE 40-FOOT HIGH DIKE SEPARATING THE NORTH AND SOUTH PONDS.

ADDITIONAL TAILING SANDS WERE DISCHARGED INTO BOTH NORTH AND SOUTH SETTLING PONDS FOLLOWING CONSTRUCTION OF THE DRAGLINE PATH. AN EAST-WEST ALIGNED DITCH WAS THEN EXCAVATED THROUGH THE SAND CAP AND WAS USED TO MOVE CLAY WASTES TO HOLDING PONDS EAST OF TURKEY CREEK. THE CLAY SLURRY WAS PUMPED FROM THE PLANT NEAR THE EXISTING TARGET RANGE TO THE DITCH, WHICH BEGAN IMMEDIATELY NORTH OF THE OIL AND GREASE DISPOSAL POND, WHERE IT FLOWED DOWNGRADIENT TO THE EAST AND THROUGH A PIPE-LINE CROSSING TURKEY CREEK.

5.3 POST-MINING GEOLOGY

SURFICIAL GEOLOGY IN THE SYDNEY SITE AREA HAS BEEN SEVERELY DISRUPTED BY PHOSPHATE MINING ACTIVITIES. THE WATER TABLE IN THE IMMEDIATE AREA OF THE DISPOSAL, SITE IS PERCHED, AND IS A MAN-MADE AQUIFER COMPOSED OF TAILING SANDS. CONTAINMENT PERCOLATION FROM THE DISPOSAL PONDS IS PREDOMINANTLY LATERAL IN THE TAILING SANDS DUE TO THE EXTREMELY LOW PERMEABILITY OF THE UNDERLYING SLIMES.

THE PLEISTOCENE SANDS, ALL OR PART OF THE BONE VALLEY FORMATION, AND SOME OF THE UPPER HAWTHORN FORMATION CLAYS WERE EXCAVATED BY DRAGLINES. PHOSPHATE ORE WAS PUMPED TO THE PROCESSING PLANT IN A SLURRY WHERE THE PHOSPHATE WAS SEPARATED FROM THE WASTE MATERIAL. TWO TYPES OF WASTE MATERIAL WERE GENERATED DURING THE SEPARATION PROCESS: SAND TAILINGS, THE COARSE SAND FRACTION; AND SLIMES, COMPOSED PRIMARILY OF CLAYS AND SILT SIZE QUARTZ AND PHOSPHATE PARTICLES. ONCE SEPARATED, THE PHOSPHATE SLIMES WERE PUMPED TO SETTLING PONDS CONSTRUCTED IN MINED AREAS, OR IN SOME INSTANCES, ON UNDISTURBED GROUND. THE TAILING SANDS WERE PUMPED INTO SOME OF THE PONDS AFTER THEY WERE FILLED WITH WASTE CLAYS.

ALL OVERBURDEN MATERIAL ABOVE THE BONE VALLEY PHOSPHATE ORE ZONE WAS REMOVED AND PLACED INTO LINEAR PILES THAT PARALLELED THE MINING CUTS. MUCH OF THE OVERBURDEN REMAINED IN THE CLAY SETTLING PONDS WITH THE REMAINDER USED TO CONSTRUCT THE EXISTING POND RETENTION DIKES.

THE RETENTION DIKES WERE CONSTRUCTED FROM A WIDE RANGE OF MATERIAL, BUT WERE PRIMARILY OVERBURDEN SANDS AND SANDY CLAYS WITHOUT UNIFORM ARRANGEMENT. THE OVERALL PERMEABILITY OF THE MATERIAL IN THE RETENTION DIKES WAS FAIRLY HIGH. WEST OF THE SYDNEY SITE, THE DIKE WAS FOUND TO CONTAIN PHOSPHATE SLIME IN THE UPPER SECTIONS WHICH RETARDS DOWNWARD FILTRATION.

HARDPAN LAYERS WITHIN THE RETENTION DIKE NORTH AND WEST OF THE SYDNEY SITE. THESE HARDENED SAND LAYERS WERE SEMI-CEMENTED BY IRON OXIDE AND/OR CALCIUM CARBONATE THAT PRECIPITATED FROM GROUND WATER GENERALLY IN THE ZONE OF WATER TABLE FLUCTUATION. NORTH OF THE SITE, THE HARDPAN OCCURRED AT 18 TO 20 FEET BELOW LAND SURFACE (BLS). THE DIKE SECTION WEST OF THE SITE WAS FOUND TO CONTAIN A HARDPAN LAYER AT A DEPTH OF 15 TO 16 FEET BLS.

THE OVERBURDEN MOUNDS IN THE SOUTH POND GENERALLY RAN NORTH-SOUTH. THESE LINEAR FEATURES WERE SPACED APPROXIMATELY 150 TO 250 FEET APART AND WERE COMPOSED OF MATERIAL SIMILAR TO THAT OCCURRING IN THE RETENTION DIKES.

THE SEPTIC WASTE DISPOSAL PIT WAS LOCATED IMMEDIATELY ABOVE THE SMALL NORTHWEST TRENDING

OVERBURDEN MOUND AND ON THE NORTHERN FLANK OF ANOTHER. A THIRD MOUND OCCURRED BENEATH THE EASTERN SECTION OF THE PIT.

THE OIL AND GREASE DISPOSAL PIT WAS CONSTRUCTED ABOVE THE NORTH AND OF ONE OF THE OVERBURDEN MOUNDS. THE WASTE CLAY SLURRY WAS PUMPED INTO A HOLDING POND WHERE THE CLAYS SLOWLY SETTLED TO THE BOTTOM AND CONSOLIDATED OVER A PERIOD OF MANY YEARS. THE CLAY LAYER WAS THICKER IN THE TROUGHS BETWEEN OVERBURDEN PILES AND IN THE TROUGH THAT GENERALLY OCCURRED AT THE BASE OF THE RETENTION DIKES. THE CLAYS WERE THINNER WHERE THEY COVERED THE LOWER OVERBURDEN MOUNDS AND ALONG THE SLOPES OF THE RETENTION DIKES WHERE IT WAS ESTIMATED TO BE LESS THAN FIVE (5) FEET THICK.

MINING OPERATIONS AT THE SYDNEY SITE HAVE ALERTED THE CONFIGURATION OF THE LOCAL SUBSURFACE. SEVERAL GEOLOGIC HORIZONS WERE EXPOSED IN THE MINING PITS AS A VARIETY OF FACTORS INFLUENCED THE DEPTH TO WHICH THE DRAGLINES EXCAVATED. DITCHES WERE EXCAVATED AROUND MINING CUTS TO FACILITATE MATRIX DEWATERING AND TO PROVIDE MATERIAL FOR DAM CONSTRUCTION. THIS RESULTED IN TRENCHES THROUGHOUT THE SITE, WHICH WERE EXCAVATED INTO THE TOP OF LIMESTONE AND WERE DEEPER THAN THE MINING CUTS.

SINCE PHOSPHATE ORE CONCENTRATIONS VARIED, SOME AREAS WERE EXCAVATED TO THE TOP OF THE LIMESTONE AND OTHERS WERE NEVER MINED. THE END RESULT PRODUCED A TOPOGRAPHIC SURFACE IN WHICH THE UPPER BONE VALLEY, LOWER BONE VALLEY, AND THE HAWTHORN FORMATION WERE EXPOSED.

5.4 PRESENT SITE HYDROGEOLOGY

THE HYDROGEOLOGIC FRAMEWORK OF THE SYDNEY SITE IS QUITE COMPLICATED. (SEE FIGURE 5.4.) THE ORIGINAL EARTH MATERIALS AT THE SITE HAVE BEEN REARRANGED INTO A SERIES OF MAN-MADE AQUIFERS AND CONFINING UNITS. THE UPPERMOST UNIT IS COMPRISED OF TAILING SAND DERIVED FROM THE ORE PREPARATION PROCESS. THESE SANDS ARE RELATIVELY PERMEABLE HAVING AN ESTIMATED HORIZONTAL PERMEABILITY OF 1.0 X10-3 CENTIMETER PER SECOND. (CM/SEC). WELLS INSTALLED INTO THIS UNIT READILY RECOVER CONTAMINANTS USING VACUUM PUMPING. THE TAILING SANDS COMPRISE THE UNIT IN WHICH THE OIL POND WASTES AND SEPTAGE POND WASTES WERE DISPOSED. DURING THE RAINY SEASON, THE WATER TABLE IN THE TAILING SANDS RISES CAUSING CONTAMINATED GROUND WATER TO FLOW NORTHWARD AND DOWN ONTO THE NORTH DIKE SILTY SANDS.

THESE TAILING SANDS REST ON PARTIALLY CONSOLIDATED, VERY LOW PERMEABILITY, PHOSPHATIC CLAY WASTES (SLIMES). DIRECT DOWNWARD MOVEMENT OF THE OIL POND WASTES AND THE SEPTAGE POND WASTES IS PREVENTED BY THESE CLAYS. THE TAILING SANDS NORTH OF THE NORTH DIKE CONTAIN A SEPARATE WATER TABLE FROM THOSE UNCONTAMINATED BECAUSE THEY ARE POSITIONED IN SUCH A MANNER THAT CONTAMINATED GROUND WATER FLOWS DOWNWARD FROM THE TAILING SANDS LOCATED SOUTH OF THE DIKE, THE SILTY SANDS OF THE NORTH DIKE ARE ALSO CONTAMINATED.

THESE SILTY SANDS COMPRISING THE DIKE WERE OBTAINED FROM THE SPOIL ROWS (LONG, PARALLEL ROWS TRENDING NORTH-SOUTH AT LOCATIONS SOUTH OF THE NORTH DIKE AND EAST-WEST AT LOCATIONS TO THE NORTH OF THE NORTH PERMEABILITY (FIVE WELLS) OF 6.0 X 10-4 CM/SEC. GROUND WATER RECOVERY WELLS IN THE SILTY SANDS OF THE NORTH DIKE AND THE SPOIL ROWS IS SLOW; SUCH WELLS ARE CAPABLE OF PRODUCING ONLY 0.25 TO 3 GPM. ACCORDINGLY, HORIZONTAL MOVEMENT OF GROUND WATER CONTAMINANTS IN THE SPOIL ROW SILTY SAND MATERIAL IS VERY SLOW.

UNDERLYING THE SPOIL ROW SANDS ARE VERY LOW PERMEABILITY CLAYS OF THE UNMINED ZONE. THESE CLAYS, BELONGING TO THE UPPERMOST PART OF THE BONE VALLEY FORMATION, REPRESENT THE BASE OF MINING OPERATIONS. THE CLAYS APPEAR TO HAVE BEEN BREACHED LOCALLY BY MINING OPERATIONS. THIS HAS ALLOWED THE DOWNWARD MIGRATION OF CONTAMINANTS INTO SAND STRINGERS OR LAYERS OF MORE PERMEABLE PHOSPHATIC SANDS WITHIN THE BONE VALLEY UNIT. THE BONE VALLEY RESTS ON TOP OF CLAYS COMPRISING THE UPPER PORTION OF THE HAWTHORN FORMATION. UNDERLYING THIS CLAYEY ZONE ARE FOUND

THE LIMESTONES (DOLOMITE) OF THE HAWTHORN FORMATION.

5.5 GROUND WATER: SURFICIAL AQUIFER SYSTEMS

WATER LEVEL MEASUREMENTS FROM MONITOR WELLS NEAR THE SYDNEY SITE HAVE IDENTIFIED TWO DISTINCT SURFICIAL AQUIFER (WATER TABLE) SYSTEMS. ONE IS A PERCHED WATER TABLE WITHIN THE TAILING SANDS THAT COVER THE SOUTH CLAY SETTLING POND. A SECOND WATER TABLE AQUIFER EXISTS NORTH OF THE SITE. THE LATTER OCCURS AT A LOWER ELEVATION THAN THE PERCHED SYSTEM AND IS AERIALLY MORE EXTENSIVE AND IS PERCHED ON EITHER FORMATIONAL CLAY OR BY CLAY SLIMS ABOVE FORMATIONAL CLAY. THIS LOCAL WATER TABLE AQUIFER IS HYDRAULICALLY CONNECTED TO THE SURFACE WATER SYSTEMS BY DRAINAGE DITCHES WEST OF THE SITE AS WELL AS TO TURKEY CREEK LOCATED ONE-HALF MILE EAST OF THE SITE. THE WATER TABLE IS HIGHEST SOUTH OF THE SITE, WITHIN THE TOPOGRAPHICALLY HIGH SAND TAILINGS WHERE IT IS PERCHED ON CLAY SLIMES AND HARDPAN ZONES THAT FORM PART OF THE DIKE.

THE LOWER WATER TABLE SYSTEM EXTENDS FROM WITHIN THE RETENTION DIKE NORTH OF THE SITE INTO THE NORTH SLIMES POND AND RANGES IN ELEVATION FROM 68 FEET TO ABOUT 71 FEET ABOVE MEAN SEA LEVEL. THE SYDNEY SITE IS LOCATED IN AN AREA OF RECHARGE. GROUND WATER MOVES FROM THE UPPER PERCHED SYSTEM ACROSS THE NORTHERN DIKE STRUCTURE AND INFILTRATES DOWNWARD INTO THE LOWER WATER TABLE SYSTEM. THE PRIMARY DIRECTIONS OF PERCHED GROUND WATER MOVEMENT ARE NORTH, NORTHWEST, AND EAST.

5.6 HAWTHORN FORMATION

THE HAWTHORN FORMATION AT THE SYDNEY SITE IS CHARACTERIZED BY VARYING LITHOLOGIES. LOCALLY, LIMESTONES WITHIN THE HAWTHORN MAY CONSTITUTE AQUIFERS; HOWEVER, GENERALLY THE HAWTHORN IS NOT AN AQUIFER AND YIELDS ONLY MINIMAL QUANTITIES OF WATER TO WELLS. THE HAWTHORN UNDERLIES ZONES OF CONTAMINATION WITH CONSIDERABLE SEPARATION BY STIFF TO STICKY CLAYS. SAMPLING RESULTS INDICATE THAT THESE NATURAL CLAYS HAVE A VERTICAL PERMEABILITY RANGING FROM 3.5 X 10-8 TO 7.28 X 10-8 CM/SEC.

TEST DRILLING DATA INDICATES THAT THE UPPERMOST PORTION OF THE HAWTHORN IS COMPOSED PRIMARILY OF IMPERMEABLE CLAYS CONTAINING THE THIN LENSES OF LIMESTONE. THIS PORTION OF THE HAWTHORN IS INTERBEDDED CLAY, SAND, CLAYEY SAND, SANDY CLAY, AND IMPURE SANDY OR CLAYEY LIMESTONE OR DOLOMITE, ALL CONTAINING VARYING AMOUNTS OF PHOSPHATE NODULES. TO THE WEST, THE HAWTHORN IS CLAYIER WITH PERSISTENT BUT THIN LIMESTONE LENSES. AT THE SYDNEY SITE, THESE LAYERS OCCUR IN THE LOWER PART OF THE FORMATION AND ARE GENERALLY ONE TO TWO FEET THICK.

5.7 FLORIDAN AQUIFER

THE FLORIDAN AQUIFER IS THE PRINCIPAL ARTESIAN AQUIFER IN CENTRAL FLORIDA. IT IS COMPRISED OF THE TERTIARY CARBONATE ROCK UNITS BELOW THE HAWTHORN FORMATION AND IS GENERALLY SEPARATED FROM THE HAWTHORN FORMATION BY CONFINING CLAYS WITHIN TAMPA, EXCEPT IN LOCALIZED AREAS WHERE CLAY IS ABSENT. (SEE FIGURE 5.1).

THE WATER SUPPLY FOR DOMESTIC, PUBLIC, AND MUNICIPAL PURPOSES COMES PRIMARILY FROM THE UPPER UNITS OF THE FLORIDAN. DOMESTIC WELLS ARE GENERALLY ABOUT 170 FEET DEEP, PUBLIC SUPPLY WELLS ARE 300 TO 400 FEET DEEP, AND IRRIGATION WELLS ARE 200 AND 500 FEET DEEP.

5.8 SURFACE WATER

MUCH OF THE RAIN THAT FALLS ON THE SYDNEY SITE RAPIDLY INFILTRATES DOWNWARD INTO THE SURFICIAL SANDS REPLENISHING THE PERCHED WATER TABLE AND AREA WATER TABLE SYSTEMS. THE REMAINDER ACCUMULATES IN THE DRAINAGE DITCHES ON SITE AND ULTIMATELY FLOWS INTO TURKEY CREEK. TURKEY CREEK IS THE PRIMARY DRAINAGE OUTLET FOR THE SITE. IT FLOWS SOUTHWARD ALONG THE EASTERN PROPERTY BOUNDARY AND DISCHARGES INTO THE ALAFIA RIVER TO THE SOUTH.

NATURAL SURFACE WATER RUNOFF PATTERNS HAVE BEEN DRASTICALLY ALTERED BY MINING ACTIVITIES, FURTHER CHANGED BY THE CONSTRUCTION OF THE DISPOSAL PITS, AND THEN MODIFIED BY THE REMEDIATION ACTIVITIES. SOUTH AND WEST OF THE SITE, SURFACE RUNOFF IS COLLECTED IN A DITCH LOCATED SOUTH OF THE ACCESS ROAD. WATER IN THIS DITCH IS CONVEYED TO A LARGER DITCH WHICH FLOWS IN AN EASTERLY DIRECTION. THE LATTER ALSO DRAINS THE WESTERN SIDE OF THE SITE AND ULTIMATELY DISCHARGES INTO TURKEY CREEK. EAST OF THE SITE, SURFACE RUNOFF FLOWS IN AN EASTERLY DIRECTION. DURING THE RAINY SEASON, THE PERCHED GROUND WATER LEVEL AROUND THE SITE RISES FORMING PONDS AND SPRINGS.

6.0 SUMMARY OF SITE RISKS

6.1 IDENTIFICATION OF THE CONTAMINANTS OF CONCERN

INDICATOR CHEMICALS ARE SELECTED ON A SITE SPECIFIC BASIS. THE COMPOUNDS SELECTED WERE THOSE COMPOUNDS WHICH ARE THE MOST TOXIC, MOBILE, AND PRESENTLY PERSISTENT CHEMICALS AT THE SITE. VOLATILE ORGANIC COMPOUNDS REPRESENT THE PRINCIPAL CONTAMINANT GROUP AT THE SITE. THESE COMPOUNDS WERE PREDOMINANT IN THE SLUDGES ORIGINALLY ANALYZED IN THE WASTE PONDS IN 1983 AND CONTINUE TO BE PRESENT AT LOWER LEVELS IN GROUND WATER ADJACENT TO AND NORTH OF THE FORMER DISPOSAL PONDS. GROUND WATER DATA RELATIVE TO VOLATILE SEMI-VOLATILE ORGANIC CONTAMINANTS ARE SUMMARIZED IN APPENDIX A. (SEE FIGURES 6.1 AND 6.2). ALTHOUGH THE COMPOSITING TECHNIQUE IS NOT GENERALLY RECOMMENDED, THE RISK LEVELS THAT WERE QUANTIFIED USING THESE EXPOSURE CONCENTRATIONS INDICATE THAT GROUNDWATER REMEDIATION IS REQUIRED WHICH IS PRESENTLY ONGOING.

SURFACE WATER SAMPLES WERE COLLECTED BY EPA FROM TURKEY CREEK (THE NEAREST NAMED SURFACE WATER BODY LOCATED EAST OF THE FORMER DISPOSAL AREA). ANALYSIS INDICATES THAT VOLATILE ORGANICS WERE NOT DETECTED IN THIS CREEK.

WHERE POSSIBLE SEMI-VOLATILES WERE CONSIDERED IN THE RISK ASSESSMENT. NO METALS, PCBS, OR DIOXINS WERE CONSIDERED TO BE CONTAMINANTS OF CONCERN, EITHER BECAUSE THEY WERE NOT DETECTED, OR BECAUSE OF THEIR PAUCITY OF DETECTION RELATIVE TO THE VOLATILE ORGANIC CHEMICALS.

6.2 EXPOSURE ASSESSMENT SUMMARY

THE RISK ASSESSMENT FOR THIS SITE WAS DEVELOPED USING AN EXPOSURE POINT CONCENTRATION ESTIMATION MODEL TO PERFORM THE RISK ANALYSIS. THIS APPROACH WAS SEMI-QUANTITATIVE AND WAS NOT A COMPUTER MODEL.

EXPOSURES AT THE SITE WERE CONSIDERED FOR BOTH POTENTIAL CURRENT AND POTENTIAL FUTURE SCENARIOS. THE PATHWAYS CONSIDERED FOR POTENTIAL CURRENT EXPOSURES WERE LIMITED TO THE FOLLOWING:

1. AIR - INHALATION OF VAPORS RELEASED TO THE AIR FROM SUBSURFACE SOILS OR GROUND WATER. THE RECEPTORS COULD BE ON-SITE TRESPASSERS, CHILDREN PLAYING ON THE SITE, DIRT BIKE RIDERS, AND HUNTERS.

2. WILDLIFE - INGESTION OF CONTAMINANTS BIOACCUMULATED IN GAME BIRDS OR ANIMALS LIVING ON OR NEAR THE SITE (THERE IS NO EVIDENCE TO SUGGEST THE PRESENCE OF CONTAMINATED GAME).

THE PATHWAYS CONSIDERED FOR POTENTIAL FUTURE EXPOSURE EXPOSURES INCLUDED THE FOLLOWING:

1. RESIDENTIAL - INHALATION OF VAPORS RELEASED FROM SUBSURFACE SOILS OR GROUND WATER; INHALATION OF VOCS RELEASED DURING HOUSEHOLD USE; AND INGESTION OF CONTAMINATED GROUND WATER. THE RECEPTORS WERE CONSIDERED TO BE ON-SITE AND DOWNGRADIENT OFF-SITE RESIDENTS.

2. INDUSTRIAL - INHALATION OF CONTAMINATED PARTICLES AND/OR VAPORS RELEASED FROM SOILS AND

GROUND WATER; DIRECT CONTACT WITH AND/OR INCIDENTAL INGESTION OF CONTAMINANTS; INGESTION OF CONTAMINATED GROUND WATER. RECEPTORS INCLUDE ON-SITE WORKERS.

3. RECREATIONAL - INHALATION OF VAPORS RELEASED FROM SOILS; INGESTION OF CONTAMINANTS, BIOACCUMULATED IN WILDLIFE LIVING ON OR NEAR THE SITE. THE RECEPTORS ARE CONSIDERED TO BE VISITORS TO A FUTURE PARK AND HUNTERS AND THEIR FAMILIES WHO MAY CONSUME GAME PRESUMED TO BE CONTAMINATED.

ONLY GROUND WATER EXPOSURES CONSIDERED IN THE POTENTIAL FUTURE SITE CONDITION AND USE SETTING WERE QUANTIFIED. OTHER EXPOSURES WERE CONSIDERED QUALITATIVELY RELATIVE TO THEIR IMPACT ON THE OVERALL ASSESSMENT OF RISK.

6.3 SUMMARY OF THE TOXICITY ASSESSMENT OF THE CONTAMINANTS OF CONCERN

CANCER POTENCY FACTORS (CDFS) HAVE BEEN DEVELOPED BY EPA'S CARCINOGENIC ASSESSMENT GROUP FOR ESTIMATING EXCESS LIFETIME CANCER RISKS ASSOCIATED WITH EXPOSURE TO POTENTIALLY CARCINOGENIC CHEMICALS. CPFS, WHICH ARE EXPRESSED IN UNITS OF (MG/KG-DAY)-1 ARE MULTIPLIED BY THE ESTIMATED INTAKE OF A POTENTIAL CARCINOGEN, IN MG/KG-DAY, TO PROVIDE AN UPPER-BOUND ESTIMATE OF THE EXCESS LIFETIME CANCER RISK ASSOCIATED WITH EXPOSURE AT THAT INTAKE LEVEL.

THE TERM "UPPER BOUND" REFLECTS THE CONSERVATIVE ESTIMATE OF THE RISK CALCULATED FROM THE CPF. USE OF THIS APPROACH MAKES UNDERESTIMATION OF THE ACTUAL CANCER RISK HIGHLY UNLIKELY. CANCER POTENCY FACTORS ARE DERIVED FROM THE RESULTS OF HUMAN EPIDEMIOLOGICAL STUDIES OR CHRONIC ANIMAL BIOASSAYS TO WHICH ANIMAL-TO-HUMAN EXTRAPOLATION AND UNCERTAINTY FACTORS HAVE BEEN APPLIED.

REFERENCE DOSES (RFDS) HAVE BEEN DEVELOPED BY EPA FOR INDICATING THE POTENTIAL FOR ADVERSE HEALTH EFFECTS FROM EXPOSURE TO CHEMICALS EXHIBITING NONCARCINOGENIC EFFECTS. RFDS, WHICH ARE EXPRESSED IN UNITS OF MG/KG-DAY, ARE ESTIMATES OF LIFETIME DAILY EXPOSURE LEVELS FOR HUMANS, INCLUDING SENSITIVE INDIVIDUALS. ESTIMATED INTAKES OF CHEMICALS FROM ENVIRONMENTAL MEDIA (E.G., THE AMOUNT OF A CHEMICAL INGESTED FROM CONTAMINATED DRINKING WATER) CAN BE COMPARED TO THE RFD. RFDS ARE DERIVED FROM HUMAN EPIDEMIOLOGICAL STUDIES OR ANIMAL STUDIES TO WHICH UNCERTAINTY FACTORS HAVE BEEN APPLIED (E.G., TO ACCOUNT FOR THE USE OF ANIMAL DATA TO PREDICT EFFECTS ON HUMANS.) THESE UNCERTAINTY FACTORS HELP ENSURE THAT THE RFDS WILL NOT UNDERESTIMATE THE POTENTIAL FOR ADVERSE NONCARCINOGENIC EFFECTS TO OCCUR.

NOT ALL COMPOUNDS HAVE AN ESTABLISHED RFD FOR EITHER THE INGESTION OR INHALATION ROUTE, OR BOTH. THEREFORE, WHERE AN RFD WAS NOT AVAILABLE, THE EXPOSURE TO THAT COMPOUND WAS NOT QUANTITATIVELY EVALUATED. ONLY RFDS PUBLISHED TO DATE IN THE INTEGRATED RICK INFORMATION SYSTEM (IRIS) DATABASE WERE CONSIDERED FOR USE IN THE RISK ASSESSMENT. THE FOLLOWING TABLE 6.1 CONTAINS THE CANCER POTENCY FACTORS AND REFERENCES DOSES FOR THE CONTAMINANTS OF CONCERN.

ORAL TOXICITY VALUES FOR THE CONTAMINANTS OF CONCERN

COMPOUND	REFERENCE DOSE (MG/KG-DAY)	POTENCY FACTOR (MG/KG-DAY)-1
1,1,1-TRICHLOROETHANE	9X10-2	NA
1,1-DICHLOROETHANE	1X10-1	9.1X10-2
1,2-DICHLOROETHANENA	9.1X10-2	
1,1-DICHLOROETHENE	9X10-3	6.0X10-1
BENZENENA	2.9X10-2	
CHLOROBENZENE	2X10-2	NA
ETHYL BENZENE	1X10-1	NA
TOLUENE	3X10-1	NA
VINYL CHLORIDE	NA	2.3X10-0

6.4 RISK CHARACTERIZATION SUMMARY

EXCESS LIFETIME CANCER RISKS ARE DETERMINED BY MULTIPLYING THE INTAKE LEVEL WITH THE CANCER POTENCY FACTOR. THESE RISKS ARE PROBABILITIES THAT ARE GENERALLY EXPRESSED IN SCIENTIFIC NOTATION (E.G. 1X10-6). AN EXCESS LIFETIME CANCER RISK OF 1 X 10-6 INDICATES THAT, AS A PLAUSIBLE UPPER BOUND, AN INDIVIDUAL HAS A ONE IN ONE MILLION CHANCE OF DEVELOPING CANCER AS A RESULT OF SITE-RELATED EXPOSURE TO A CARCINOGEN OVER A 70-YEAR LIFETIME UNDER THE SPECIFIC EXPOSURE CONDITIONS AT A SITE.

POTENTIAL CONCERN FOR NONCARCINOGENIC EFFECTS OF A SINGLE CONTAMINANT IN A SINGLE MEDIUM IS EXPRESSED AS THE HAZARD QUOTIENT WHICH IS THE RATIO OF THE ESTIMATED INTAKE DERIVED FROM THE CONTAMINANT CONCENTRATION IN A GIVEN MEDIUM TO THE CONTAMINANT'S REFERENCE DOSE. IF THE HAZARD QUOTIENT (HQ) EXCEED'S UNITY, THIS IS AN INDICATION THAT EXPOSURE LEVELS ARE GREATER THAN THE RFD AND THERE IS A POTENTIAL FOR NONCANCER HEALTH EFFECTS. BY ADDING THE HQS FOR ALL CONTAMINANTS WITHIN A MEDIUM OR ACROSS ALL MEDIA TO WHICH A GIVEN POPULATION MAY REASONABLY BE EXPOSED, THE HAZARD INDEX (HI) CAN BE GENERATED. THE HI PROVIDES A USEFUL REFERENCE POINT FOR GAUGING THE POTENTIAL SIGNIFICANCE OF MULTIPLE CONTAMINANT EXPOSURES WITHIN A SINGLE MEDIUM OR ACROSS MEDIA.

THE RISK ASSESSMENT INDICATES THAT THERE MAY BE A POTENTIAL FOR ADVERSE HUMAN HEALTH EFFECTS TO ON-SITE RESIDENTS DUE TO THE INGESTION OF COMPOUNDS CLASSIFIED AS CARCINOGENIC. BASED ON THE POTENTIAL FUTURE, ON-SITE, RESIDENTIAL USE SCENARIO, THE ESTIMATED LIFETIME CANCER RISKS WERE GENERALLY GREATER THAN THE 1 X 10-7 ACCEPTABLE RANGE.

FOR THE FUTURE POTENTIAL OFF-SITE GROUND WATER USE SCENARIO WHICH ASSUMED OFF-SITE MIGRATION OF GROUND WATER CONTAMINATION AND SUBSEQUENT GROUND WATER INGESTION, THE ESTIMATED EXCESS LIFETIME CANCER RISKS GENERALLY FALL WITHIN THE ACCEPTABLE RISK RANGE IDENTIFIED BY EPA (GIVEN THE ASSUMPTIONS USED TO ESTIMATE THE EXPOSURE POINT CONCENTRATIONS AND THE INHERENT UNCERTAINTIES IN THE MODEL USED TO PREDICT OFF-SITE MIGRATION TENDENCIES. THE NONCARCINOGENIC DAILY INTAKE COMPARED TO RFDS SHOWED NO EXCEEDANCES OF THE RFDS, AND THE HAZARD INDICES DID NOT EXCEED ONE IN ANY CASE EXAMINED.

RELEASES OR THREATENED RELEASES OF HAZARDOUS SUBSTANCES FROM THIS SITE, IF NOT ADDRESSED BY IMPLEMENTING THE RESPONSE ACTION IN THIS ROD, MAY PRESENT AN UNACCEPTABLE RISK TO PUBLIC HEALTH, WELFARE, OR THE ENVIRONMENT.

7.0 DESCRIPTION OF ALTERNATIVES

THREE ALTERNATIVES WERE CONSIDERED FOR REMEDIATION OF THE GROUND WATER AT THE SYDNEY SITE. THE FOLLOWING REMEDIAL ALTERNATIVES WHICH WERE CONSIDERED ARE DISCUSSED IN THE NEXT SECTIONS:

- ALTERNATIVE 1 - NO ACTION
- ALTERNATIVE 2 - CONTINUED OPERATION OF THE EXISTING GROUND WATER RECOVERY AND TREATMENT SYSTEM
- ALTERNATIVE 3 - EVALUATION/MODIFICATION OF THE EXISTING GROUND WATER RECOVERY AND TREATMENT SYSTEM

7.1 ALTERNATIVE 1 - NO ACTION

THE SUPERFUND PROGRAM REQUIRES THAT THE NO ACTION ALTERNATIVE BE CONSIDERED AT EVERY SITE. UNDER THE NO ACTION ALTERNATIVE, EPA WOULD TAKE NO ACTION AT THE SITE TO CONTROL THE SOURCE OF

CONTAMINATION. THE NO ACTION ALTERNATIVE SERVES AS A BASELINE WITH WHICH OTHER ALTERNATIVES CAN BE COMPARED. POTENTIAL HUMAN HEALTH RISKS ASSOCIATED WITH CURRENT EXPOSURE PATHS WOULD REMAIN ON SITE. THIS ALTERNATIVE EXCEEDS THE TARGET RISK RANGE AND DOES NOT ATTAIN ARARS.

THE NO ACTION ALTERNATIVE PROPOSES LEAVING THE SITE IN ITS PRESENT CONDITION AND STOPPING THE GROUND WATER RECOVERY AND TREATMENT SYSTEM. GROUND WATER MONITORING WOULD CONTINUE. A REVIEW WOULD BE PERFORMED EVERY FIVE (5) YEARS AS LONG AS CONTAMINANTS REMAIN ABOVE HEALTH-BASED LEVELS TO EVALUATE POTENTIAL CHANGES IN RISK ASSOCIATED WITH NO ACTION.

THE PRESENT WORTH COST OF THIS ALTERNATIVE INCLUDES ONLY GROUND WATER MONITORING AND IS ESTIMATED AT $240,000.

7.2 ALTERNATIVE 2 - CONTINUED OPERATION OF THE EXISTING GROUND WATER RECOVERY AND TREATMENT SYSTEM

THE EXISTING RECOVERY AND TREATMENT SYSTEM WAS INSTALLED IN LATE 1984. THE RECOVERY SYSTEM PUMPS GROUND WATER FROM A TOTAL OF 71 WELLS (40 SLURRY WALL WELLS, 13 NORTH DIKE WELLS, 6 SPOIL ROW WELLS, AND 12 OIL POND RECOVERY WELLS.) THE TREATMENT SYSTEM CONSISTS OF AN AIR STRIPPER WHICH USES A FORCED AIR AND WATER PROCESS TO REMOVE THE CONTAMINANTS FROM THE WATER. THE TREATED WATER IS THEN SPRAYED OVER A PORTION OF THE DISPOSAL SITE TO FACILITATE FLUSHING OR THE AQUIFER. BETWEEN 400,000 AND 1,000,000 GALLONS OF WATER IS BEING RECOVERED AND TREATED EACH WEEK.

GROUND WATER USE RESTRICTIONS WOULD BE IMPOSED ON-SITE AND WITHIN A REASONABLE DISTANCE OF THE SITE DURING REMEDIATION AND OPERATION AND MAINTENANCE IN KEEPING WITH THE ESTABLISHMENT OF MAXIMUM LEVELS OF GROUND WATER CONTAMINANTS. THIS ALTERNATIVE WOULD SERVE AS AN EFFECTIVE MEASURE TOWARD PREVENTING POTENTIAL EXPOSURE BY INGESTION OF CONTAMINATED GROUND WATER.

A QUARTERLY MONITORING PROGRAM TO ANALYZE FOR THOSE GROUND WATER CONSTITUENTS OF CONCERN WOULD BE IMPLEMENTED FOR A PERIOD OF FIVE (5) YEARS. A REVIEW WOULD BE CONDUCTED BY EPA EVERY FIVE (5) YEARS FOLLOWING REMEDIAL ACTION COMPLETION IF CONTAMINATION REMAINS ABOVE HEALTH-BASED LEVELS. FOLLOWING THE FIRST REVIEW, MONITORING WOULD CONTINUE ANNUALLY PROVIDED THE REVIEW DOES NOT IDENTIFY A NEED FOR FURTHER REMEDIAL ACTION OR MONITORING, OR THAT HEALTH-BASED LEVELS ARE ATTAINED THROUGHOUT THE AQUIFER SYSTEMS.

THE PRESENT (1989) VALUE COST FOR THIS ALTERNATIVE IS ESTIMATED AT $1,392,000. THIS COST INCLUDES OPERATION AND MAINTENANCE OF THE EXISTING SYSTEM FOR TWO YEARS (8 QUARTERS) AT $144,000 PER QUARTER AND GROUND WATER MONITORING FOR FIVE YEARS (20 QUARTERS) AT $12,000 PER QUARTER.

7.3 ALTERNATIVE 3 - EVALUATION/MODIFICATION OF THE EXISTING GROUND WATER RECOVERY AND TREATMENT SYSTEM

THIS ALTERNATIVE INVOLVES CONTINUED OPERATION OF THE EXISTING RECOVERY AND TREATMENT SYSTEM AS WELL AS AN EVALUATION OF THE ENTIRE SYSTEM TO DETERMINE ITS EFFECTIVENESS AND EFFICIENCY. A DETAILED ANALYSIS OF THE EXISTING SYSTEM WOULD DETERMINE IF THERE IS A NEED FOR INSTALLATION OF ADDITIONAL WELLS OR IF PUMPING OF SOME OF THE EXISTING WELLS COULD BE STOPPED. THE ANALYSIS WOULD ALSO INCLUDE DESIGNING A SCHEDULE FOR TEMPORARILY SHUTTING DOWN THE ENTIRE SYSTEM TO DETERMINE REMEDIAL ACTION SUCCESS. THIS WOULD ALLOW THE GROUND WATER TO RECHARGE AND REACH AN EQUILIBRIUM CONDITION. ADDITIONAL SAMPLING AND ANALYSES COULD THEN PRODUCE THE NECESSARY DATA TO DETERMINE IF CONTAMINANT LEVELS HAVE INDEED REACHED THE DESIRED CLEANUP LEVELS.

A QUARTERLY MONITORING PROGRAM TO ANALYZE FOR THOSE GROUND WATER CONSTITUENTS OF CONCERN WOULD BE IMPLEMENTED FOR A PERIOD OF FIVE (5) YEARS. A REVIEW WOULD BE CONDUCTED BY EPA EVERY FIVE

(5) YEARS FOLLOWING REMEDIAL ACTION COMPLETION. AFTER THE FIRST REVIEW, MONITORING WOULD CONTINUE ANNUALLY OR SEMI-ANNUALLY PROVIDED THE REVIEW DOES NOT IDENTIFY A NEED FOR FURTHER REMEDIAL ACTION OR MONITORING. ATTAINMENT OF REMEDIAL GOALS MAY BE CAUSE FOR ENDING MONITORING ACTIVITIES.

GROUND WATER USE RESTRICTIONS WOULD BE IMPOSED ON-SITE AND WITHIN A REASONABLE DISTANCE OF THE SITE DURING REMEDIATION AND OPERATION AND MAINTENANCE IN KEEPING WITH THE ESTABLISHMENT OF MAXIMUM LEVELS OF GROUND WATER CONTAMINANTS. THIS ALTERNATIVE WOULD SERVE AS AN EFFECTIVE MEASURE DURING IMPLEMENTATION OF THE REMEDIAL ACTION TOWARD PREVENTING POTENTIAL EXPOSURE BY INGESTION OF CONTAMINATED GROUND WATER.

THE PRESENT (1989) VALUE COST FOR THIS ALTERNATIVE IS ESTIMATED AT $2,448,000. THIS APPROXIMATE COST INCLUDES: DESIGN MODIFICATIONS AND CONSTRUCTION AT $480,000; OPERATION AND MAINTENANCE OF THE SYSTEM FOR THREE YEARS (12 QUARTERS) AT $144,000 PER QUARTER; AND GROUND WATER MONITORING FOR FIVE YEARS (20 QUARTERS) AT $12,000 PER QUARTER.

8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

THIS SECTION PROVIDES THE BASIS FOR DETERMINING WHICH ALTERNATIVE PROVIDES THE BEST BALANCE OF TRADE-OFFS WITH RESPECT TO THE EVALUATION CRITERIA. THE MAJOR OBJECTIVE OF THE PROPOSED PLAN WAS TO OUTLINE AND EVALUATE ALTERNATIVES FOR REMEDIATING THE SYDNEY SITE. SEVERAL REMEDIAL TECHNOLOGIES WERE IDENTIFIED FOR THE GROUND WATER CLEANUP. THESE TECHNOLOGIES WERE SCREENED BASED ON THEIR FEASIBILITY GIVEN THE CONTAMINANTS PRESENT AND SITE CHARACTERISTICS.

THREE ALTERNATIVES HAVE UNDERGONE A DETAILED EVALUATION AND WERE LISTED IN THE PREVIOUS SECTION. THE ALTERNATIVES WERE EVALUATED IN DETAIL BASED ON THE NINE EVALUATION CRITERIA REQUIRED BY SARA. A GLOSSARY OF THESE EVALUATION CRITERIA IS OFFERED IN TABLE 8.1. FOLLOWING THE GLOSSARY IS THE SUMMARY OF THE ALTERNATIVES' RELATIVE PERFORMANCE WITH RESPECT TO EACH OF THE NINE CRITERIA.

TABLE 8.1

GLOSSARY OF EVALUATION CRITERIA

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT - ADDRESSES WHETHER OR NOT A REMEDY PROVIDES ADEQUATE PROTECTION AND DESCRIBES HOW RISKS POSED THROUGH EACH PATHWAY ARE ELIMINATED, REDUCED, OR CONTROLLED THROUGH TREATMENT, ENGINEERING CONTROLS, OR INSTITUTIONAL CONTROLS.

COMPLIANCE WITH ARARS - ADDRESSES WHETHER OR NOT A REMEDY WILL MEET ALL OF THE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS OF OTHER FEDERAL AND STATE ENVIRONMENTAL STATUTES AND/OR PROVIDES GROUNDS FOR INVOKING A WAIVER.

LONG-TERM EFFECTIVENESS AND PERMANENCE - REFERS TO THE MAGNITUDE OF RESIDUAL RISK AND THE ABILITY OF A REMEDY TO MAINTAIN RELIABLE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT OVER TIME ONCE CLEANUP GOALS HAVE BEEN MET.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME - IS THE ANTICIPATED PERFORMANCE OF THE TREATMENT TECHNOLOGIES THAT MAY BE EMPLOYED IN A REMEDY.

SHORT-TERM EFFECTIVENESS - REFERS TO THE SPEED WITH WHICH THE REMEDY ACHIEVES PROTECTION, AS WELL AS THE REMEDY'S POTENTIAL TO CREATE ADVERSE IMPACTS ON HUMAN HEALTH AND THE ENVIRONMENT THAT MAY RESULT DURING THE CONSTRUCTION AND IMPLEMENTATION PERIOD.

IMPLEMENTABILITY - IS THE TECHNICAL AND ADMINISTRATIVE FEASIBILITY OF A REMEDY, INCLUDING THE AVAILABILITY OF MATERIALS AND SERVICES NEEDED TO IMPLEMENT THE CHOSEN SOLUTION.

COST - INCLUDES CAPITAL, OPERATION AND MAINTENANCE COSTS, AND GROUND-WATER MONITORING.

STATE ACCEPTANCE - INDICATES WHETHER THE STATE CONCURS WITH, OPPOSES, OS HAS NO COMMENT ON THE PREFERRED ALTERNATIVE.

COMMUNITY ACCEPTANCE - WILL BE ASSESSED IN THE RESPONSIVENESS SUMMARY IN THE APPENDIX OF THE RECORD OF DECISION AFTER REVIEWING THE PUBLIC COMMENTS RECEIVED ON THE PROPOSED PLAN.

SUMMARY OF COMPARATIVE ANALYSIS OF THE ALTERNATIVES

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

ALL OF THE ALTERNATIVES WITH THE EXCEPTION OF THE NO ACTION ALTERNATIVE WOULD PROVIDE ADEQUATE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT BY ELIMINATING, REDUCING, OR CONTROLLING RISK THROUGH TREATMENT, ENGINEERING CONTROLS, OR INSTITUTIONAL CONTROLS. THE PREFERRED ALTERNATIVE WOULD CONTINUE THE TREATMENT OF THE CONTAMINANTS IN THE GROUND WATER, THEREBY REDUCING RISK ASSOCIATED WITH DIRECT CONTACT AND MINIMIZING POTENTIAL MIGRATION.

ALTHOUGH THE NO ACTION ALTERNATIVE INCLUDES PAST VOLUNTARY CLEANUP ACTIONS, IT IS NOT COMPLETELY PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT. THEREFORE, IT IS NOT CONSIDERED FURTHER IN THIS ANALYSIS AS AN OPTION FOR THE SITE. THE ANALYSIS WILL NOW ONLY REFER TO ALTERNATIVES 2 AND 3.

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

BOTH ALTERNATIVES WOULD MEET RESPECTIVE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) OF FEDERAL AND STATE ENVIRONMENTAL LAWS. MAXIMUM CONTAINMENT LEVELS (MCLS) PROMULGATED UNDER THE SAFE DRINKING WATER ACT (SDWA) AND STATE OF FLORIDA ARARS, WHERE THEY ARE MORE STRINGENT, WILL GENERALLY BE THE RELEVANT AND APPROPRIATE STANDARD FOR GROUND WATER THAT IS OR MAY BE USED FOR DRINKING WATER.
THERE ARE SOME SITUATIONS WHERE AN AQUIFER THAT IS A CURRENT OR POTENTIAL DRINKING WATER SOURCE, TREATABLE TO ARARS AT THE TAP, CANNOT BE ATTAINED (E.G. BECAUSE OF COMPLEX HYDROGEOLOGY OR THERE ENVIRONMENTAL CONDITIONS), AN ARAR WAIVER FOR TECHNICAL IMPRACTICABILITY MAY BE USED. TABLE 9.1 LISTS THE GROUND-WATER REMEDIATION GOALS FOR THE SYDNEY SITE.

LONG-TERM EFFECTIVENESS AND PERMANENCE

GROUND WATER RECOVERY AND TREATMENT WOULD PRODUCE A PERMANENT REMEDY. LONG-TERM PERMANENCE AND EFFECTIVENESS MAY BE PROVIDED BY BOTH ALTERNATIVES 2 AND 3; HOWEVER, ONLY ALTERNATIVE 3 CAN PROVIDE BETTER LONG-TERM EFFECTIVENESS AND PERMANENCE BY COMPLETING A DETAILED ANALYSIS OF THE EXISTING SYSTEM AND PROVIDING APPROPRIATE SYSTEM MODIFICATIONS.

THIS ALTERNATIVE WOULD ALSO INCLUDE MAKING MODIFICATIONS, IF NECESSARY, TO THE SYSTEM WHICH IMPROVE THE EFFECTIVENESS AND EFFICIENCY. THIS MIGHT ALSO DECREASE THE LENGTH OF TIME NEEDED TO COMPLETE THE REMEDIATION.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME

BOTH ALTERNATIVES 2 AND 3 WILL REDUCE THE TOXICITY, MOBILITY, AND VOLUME OF THE GROUND WATER CONTAMINATION BY DECREASING THE SIZE OF THE CONTAMINANT PLUME. ALTERNATIVE 3 WOULD ASSURE REDUCTION OF TOXICITY, MOBILITY, AND VOLUME TO THE MAXIMUM EXTENT PRACTICABLE.

SHORT-TERM EFFECTIVENESS

ALTERNATIVES 2 AND 3 WILL REQUIRE VARYING AMOUNTS OF TIME TO ACHIEVE CLEANUP OF THE SITE. NONE WILL BE IMMEDIATELY EFFECTIVE UPON COMPLETION OF MODIFICATIONS.

IMPLEMENTABILITY

THE IMPLEMENTABILITY OF AN ALTERNATIVE IS BASED ON TECHNICAL FEASIBILITY, ADMINISTRATIVE FEASIBILITY, AND THE AVAILABILITY OF MATERIALS AND SERVICES NEEDED TO IMPLEMENT A PARTICULAR OPTION. BOTH ALTERNATIVES ARE TECHNICALLY AND ADMINISTRATIVELY FEASIBLE.

BOTH ALTERNATIVES INVOLVE TECHNOLOGIES WHICH HAVE BEEN USED IN THE PAST AND HAVE A DEMONSTRATED PERFORMANCE RECORD.

COST

BOTH ALTERNATIVES 2 AND 3 HAVE COSTS ASSOCIATED WITH OPERATION AND MAINTENANCE OF THE TREATMENT SYSTEM. FOR ALTERNATIVE 3, THE ADDITIONAL COST INCLUDES THE DESIGN AND CONSTRUCTION OF MODIFICATIONS TO THE TREATMENT SYSTEM. ALL ALTERNATIVE COST ESTIMATES, INCLUDING THE NO ACTION ALTERNATIVE, CONTAIN EXPENSES FOR FIVE YEARS OF GROUND WATER MONITORING.

STATE ACCEPTANCE

THE STATE OF FLORIDA AS REPRESENTED BY THE FLORID DEPARTMENT OF ENVIRONMENTAL REGULATION IS IN FAVOR OF THE SELECTED REMEDY FOR REMEDIATING THE GROUND WATER AT THE SYDNEY SITE.

COMMUNITY ACCEPTANCE

AT THE PUBLIC MEETING HELD ON SEPTEMBER 13, 1989, THE COMMUNITY WAS BRIEFED ON THE SELECTED REMEDY THAT WILL EFFECTIVELY PROTECT HUMAN HEALTH AND THE ENVIRONMENT.

9.0 SELECTED REMEDY

BASED ON AVAILABLE DATA AND ANALYSIS TO DATE, THE US EPA SELECTS ALTERNATIVE 3 AS THE MOST APPROPRIATE SOLUTION FOR MEETING THE GOALS OF THE GROUND WATER REMEDIATION AT THE SYDNEY SITE. BASED ON CURRENT INFORMATION, THIS ALTERNATIVE PROVIDES THE BEST BALANCE AMONG THE NINE CRITERIA THAT EPA USES TO EVALUATE ALTERNATIVES. TABLE 9.1 LISTS THE GROUND-WATER REMEDIATION GOALS FOR THIS SITE.

THIS ALTERNATIVE WOULD PROVIDE FOR AN EVALUATION OF THE EXISTING GROUND WATER RECOVERY AND TREATMENT SYSTEM CURRENTLY OPERATING AT THE SITE, FOLLOWED BY MODIFICATIONS DESIGNED TO IMPROVE THE EFFECTIVENESS AND EFFICIENCY OF THE GROUND WATER REMEDIATION. GROUND WATER PILING AND ANALYSIS WILL CONTINUE IN ORDER TO PROVIDE A BASIC FROM WHICH TO EVALUATE THE EFFECTIVENESS OF THE SYSTEM.

ALSO INCLUDED IN THIS ALTERNATIVE WILL BE THE EVALUATION OF THE NEED FOR DEED RESTRICTIONS FOR AREAS OF THE SITE WHICH MAY CONTINUE TO BE IMPACTED BY GROUND WATER CONTAMINATION AFTER THE BEST AVAILABLE REMEDIATION TECHNOLOGY HAS BEEN IMPLEMENTED. DEED RESTRICTIONS WILL PROTECT FUTURE USERS OF THE WATER SUPPLY IN THE IMMEDIATE AREA OF THE SITE. TIMELINESS OF THE REMEDIATION WILL BE IMPROVED BY MODIFYING THE SYSTEM AS APPROPRIATE TO ACHIEVE REMEDIATION GOALS.

THE RATIONALE FOR CHOOSING THIS ALTERNATIVE INCLUDES THE FOLLOWING REASONS:

- ALLOWS FOR A MORE COMPLETE AND EXPEDITIOUS REMEDIATION OF THE GROUND WATER THAN THE OTHER ALTERNATIVES;

- CONTRIBUTES TO THE IMPLEMENTATION OF A PERMANENT REMEDY AT THE SITE;

- REDUCES THE POTENTIAL FOR CONTAMINANT PLUME MIGRATION.

TABLE 9.1

GROUND WATER REMEDIATION GOALS

REMEDIATION CONTAMINANT	GOAL (UG/1)	BASIS*
1,1,1-TRICHLOROETHANE	200	PDWS
1,1-DICHLOROETHANE	3	PDWS**
1,2-DICHLOROETHANE	3	PDWS
1,1-DICHLOROETHENE	7	PDWS
BENZENE	1	PDWS
CHLOROBENZENE	100	PMCL
ETHYL BENZENE	700	PMCL
TOLUENE	2000	PMCL
VINYL CHLORIDE	1	PDWS

* PDWS = STATE OF FLORIDA PRIMARY DRINKING WATER STANDARD
PMCL = PROPOSED FEDERAL MAXIMUM CONTAMINANT LEVEL

** IN THE ABSENCE OF SUFFICIENT TOXICITY DATA, THE PRIMARY DRINKING WATER STANDARD FOR THE STRUCTURALLY SIMILAR COMPOUND, 1,2-DICHLOROETHANE, WILL BE USED.

STATUTORY DETERMINATIONS

THE US EPA HAS DETERMINED THAT THIS REMEDY WILL SATISFY THE STATUTORY REQUIREMENTS OF SECTION 121 OF CERCLA BY PROVIDING PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT, ATTAINING ARARS, PROVIDING COST-EFFECTIVENESS, AND UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE. SECTIONS 10.1 AND 10.5 BELOW ARE THE STATUTORY REQUIREMENTS FOR THIS SITE.

10.1 PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT

THE SELECTED REMEDY ADEQUATELY PROTECTS HUMAN HEALTH BY REDUCING THE RISK OF POTENTIAL CONSUMPTION OF CONTAMINATED GROUND WATER. THIS WILL BE ACCOMPLISHED THROUGH THE PREVENTION OF POTENTIAL MIGRATION AND CAPTURE OF THE REMAINING GROUND WATER CONTAMINANT PLUME. NO UNACCEPTABLE SHORT-TERM RISKS WILL RESULT FROM THE IMPLEMENTATION OF THIS REMEDY.

10.2 ATTAINMENT OF THE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

REMEDIAL ACTIONS PERFORMED UNDER CERCLA, AS AMENDED BY SARA, MUST COMPLY WITH ALL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS). THE RECOMMENDED ALTERNATIVE WAS FOUND TO MEET OR EXCEED THE ARARS. WHEN ARARS ARE NOT AVAILABLE FOR SPECIFIC COMPOUNDS OR EXPOSURE MEDIA (SUCH AS SOIL), THE CLEANUP GOALS ARE BASED ON AGENCY REFERENCE DOSES (RFD) FOR NONCARCINOGENS AND A RISK RANGE FOR CARCINOGENS OF 10-7 TO 10-4. THE GROUND-WATER REMEDIATION GOALS FOR THE SYDNEY

SITE ARE CONTAINED IN TABLE 9.1 AND ARE BASED ON THE STATE OF FLORIDA PRIMARY WATER STANDARDS OF PROPOSED FEDERAL MAXIMUM CONTAMINANT LEVELS.

THE RECOMMENDED ALTERNATIVE WAS FOUND TO MEET OR EXCEED THE FOLLOWING ARARS:

- RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) LOCATION REQUIREMENTS (40 CFR SUBPART X MISCELLANEOUS TREATMENT UNIT, 40 CFR PART 261 LAND BAN, AND 40 CFR PART 264 SUBPART G CLOSURE AND POSTCLOSURE) - MANDATES THAT HAZARDOUS WASTE TREATMENT, STORAGE, OR DISPOSAL FACILITIES LOCATED WITHIN A 100-YEAR FLOODPLAIN MUST BE DESIGNED, CONSTRUCTED, OPERATED, AND MAINTAINED TO AVOID WASHOUT. EXAMPLES OF RCRA REQUIREMENTS INCLUDE MINIMUM TECHNOLOGY STANDARDS, MONITORING REQUIREMENTS, AND STORAGE AND DISPOSAL PROHIBITIONS.

- ENDANGERED SPECIES ACT (INTERAGENCY SECTION 7 CONSULTATION PROCESS, 50 CFR PART 402) - REQUIRES ACTION TO CONSERVE ENDANGERED OR THREATENED SPECIES FOR ACTIVITIES IN CRITICAL HABITATS UPON WHICH THESE SPECIES DEPEND. THE DEPARTMENT OF INTERIOR, FISH AND WILDLIFE SERVICE, AND THE DEPARTMENT OF COMMERCE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ARE PRESENTLY BEING CONSULTED TO ASSURE THAT ENDANGERED OR THREATENED SPECIES ARE NOT ADVERSELY IMPACTED BY THIS REMEDY.

- COMPLIANCE MONITORING PROGRAM (40 CFR SECTION 264.99) ESTABLISHES CRITERIA FOR MONITORING GROUND WATER QUALITY WHEN CONTAMINANTS HAVE BEEN DETECTED. THIS INVOLVES DEVELOPMENT OF A GROUND WATER QUALITY DATA BASE SUFFICIENT ENOUGH TO CHARACTERIZE SEASONAL FLUCTUATIONS IN GROUND WATER QUALITY AT THE SITE.

- CLEAN WATER ACT/SAFE DRINKING WATER ACT - PROVIDES CRITERIA FOR GROUND WATER REMEDIATION AND DISCHARGE INTO SURFACE WATERS. EPA'S DETERMINATION OF APPROPRIATE GROUND WATER CLEANUP CRITERIA INVOLVED AN EVALUATION OF CONTAMINANT CONCENTRATIONS RELATIVE TO AVAILABLE HEALTH-BASED STANDARDS. THE LIMITS INCLUDE MAXIMUM CONCENTRATION LIMITS (MCLS) AND MAXIMUM CONCENTRATION LIMIT GOALS (MCLGS), AND FEDERAL AMBIENT WATER QUALITY CRITERIA (AWQC), SECTION 121 (D) (2) (B) (I) OF CERCLA, AS DEFINED BY THE SAFE DRINKING WATER ACT (SDWA) (40 CFR PARTS 141 AND 142) AND THE CLEAN WATER ACT.

10.3 COST-EFFECTIVENESS

THE SELECTED ALTERNATIVE, ALTHOUGH MORE COSTLY THAN THE OTHERS, PROVIDES A HIGHER DEGREE OF PROTECTIVENESS. THE MODIFIED GROUND WATER RECOVERY AND TREATMENT SYSTEM WILL CAPTURE THE PLUME AND REDUCE THE CONTAMINANT CONCENTRATIONS TO HEALTH-BASED LEVELS. IT WILL ALSO PROVIDE A MORE RAPID ATTAINMENT OF THESE LEVELS. THE US EPA HAS DETERMINED THAT THE COST OF THE SELECTED REMEDY IS PROPORTIONATE TO THE OVERALL EFFECTIVENESS AND PROTECTION PROVIDED.

10.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

THE US EPA BELIEVES THE SELECTED REMEDY IS THE MOST APPROPRIATE CLEANUP SOLUTION FOR THE SYDNEY SITE AND PROVIDES THE BEST BALANCE AMONG THE EVALUATION CRITERIA FOR THE REMEDIAL ALTERNATIVES CONSIDERED. THIS REMEDY PROVIDES EFFECTIVE PROTECTION IN BOTH THE SHORT- AND LONG-TERM TO POTENTIAL HUMAN AND ENVIRONMENTAL RECEPTORS, IS READILY IMPLEMENTED, AND IS COST-EFFECTIVE.

GROUND WATER RECOVERY AND TREATMENT REPRESENTS A PERMANENT SOLUTION THROUGH TREATMENT WHICH WILL EFFECTIVELY REDUCE AND/OR ELIMINATE MOBILITY OF HAZARDOUS WASTE AND HAZARDOUS SUBSTANCES INTO THE ENVIRONMENT.

10.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

THE STATUTORY PREFERENCE FOR TREATMENT WILL BE MET BECAUSE THE SELECTED ALTERNATIVE WILL TREAT THE PRINCIPAL THREAT FROM THE SYDNEY SITE, THAT IS, THE POTENTIAL INGESTION OF CONTAMINATED GROUND WATER. THE SELECTED REMEDY WILL REDUCE THIS RISK THROUGH CONTINUING OPERATION OF THE EXISTING GROUND WATER RECOVERY AND TREATMENT SYSTEM WITH EVALUATION AND MODIFICATION, IF NECESSARY, TO INCREASE EFFICIENCY AND EFFECTIVENESS.

TABLES AND ATTACHMENTS

DATA SUMMARY FOR MONITOR WELL BV-1; JANUARY - APRIL 1989

GEOMETRIC PARAMETER	NUMBER OF EPISODES	COMPOUND #	MEAN B SAMPLING (PPB)	DETECTED CONC. RANGE (PPB)
VINYL CHLORIDE	9	7	12.0	4-24
CHLOROETHANE	9	C	5.4	3-10
METHYLENE CHLORIDS	2	2	16.7	9-31
1,1-DICHLOROETHANE	9	9	30.6	12-43
TRANS-1,2-DICHLOROETHENE	9	C	55.7	4-11
CIS-1,2-DICHLOROETHENE	2		12	84-4
1,2-DICHLOROETHANE	9	C	75.3	4.6-10
TERT BUTYL METHYL ETHER5	5		44.1	20-168
BENZEN.	9	9	90.2	45-150
TOLUENE	9	9	28.3	12-40
ETHYLBENZENE	9		52.6	1.5-10
O,M,P-XYLENE	9	C	66.63	4-12
NAPHTHALENE	2		27.2	4-13

ABONE VALLEY FORMATION - 1 MONITORING WELL.

BGEOMETRIC MEAN INCLUDES ONE-HALF THE DETECTION LIMIT FOR VALUES REPORTED AS NON-DETECTED.

CONLY REPORTED GC/MS ANALYSES (EPA METHOD 624). ALL OTHER ANALYSES PERFORMED BY GC (EPA METHODS 601/602).

DNOT REPORTED FOR ALL SAMPLING EPISODES.

DATA SUMMARY FOR OPRW COMPOSITE(A); JANUARY - APRIL 1989

GEOMETRIC PARAMETER	NUMBER OF EPISODES	COMPOUND#	MEAN B SAMPLING (RPB)	DETECTED CONC. RANGE (PPB)
VINYL CHLORIDE	3		24.7	4.2-10
CHLOROMATHANE	3	3	20.6	18-23
DICHLOROMETHANE	3	3	12.6	8.6-18
1,1-DICHLOROETHENE	3	3	13.4	9.5-17
1,1-DICHLOROETHANE	3	3	81.5	73-99
TRANS-1,2-DICHLOROETHANE	3	3	58.6	50-67
1,1,1-TRICHLOROETHANE	3	3	360.5	260-530
TRICHLOROETHENE	3		29.2	10-14
BENZENE	3	3	48.8	45-56
TOLUENE	3	3	718.9	67O-770
ETHYL BENZENE	3	3	25.0	24-26
XYLENE TOTAL	3	3	100.0	100

A OIL POND RECOVERY WELL (OPRW) COMPOSITE, INCLUDES 12 WELLS.

B GEOMETRIC MEAN INCLUDES ONE-HALF THE DETECTION LIMIT FOR VALUES REPORTED AS NON-DETECTED DATA
SUMMARY FOR DIKE DISCHARGE COMPOSITE(A); JANUARY - APRIL 1989

GEOMETRIC PARAMETER	NUMBER OF EPISODES	#(PPB)	MEAN B (PPB)	SAMPLING DETECTED	CONC.RANGE (PPB)
VINYL CHLORIDE	15	14	20.2		10-46
CHLOROETHANA	15	14	49.5		3-200
DICHLOROMETHANE	15	14	28.3		10-62
1,1-DICHLOROETHENE	15	8	4.8		3-8.3
1,1-DICHLOROETHANE	15	18	110.4		72-230
TRANS-1,2-DICHLOROETHENE	15	13	2O.2		3-57
CIS-1,2-DICHLOROETHENE	2C	2	12.4		11-14
CHLOROFORM	15	23	8		3-8.3
1,2.DICHLOROETHANE	18	85	7		3-18
1,1,1-TRICHLOROETHANE	15	14	38.3		10-70
TRICHLOROETHENE	15	10	5.2		3-18
BENZENE	15	15	115.2		73-16
TOLUENE	15	15	233.9		140-310
ETHYLBENZENE	15	13	10.9		5-18
O,M,P-XYLENE	15C	14	38.2		10-65
O-XYLENE	2C	2	16.5		16-17
M-XYLENE	2C				133-6
P-XYLENE	2C	2	8.8		6-13
TERTBUTYLBENZENE	2C	1	2.7		3-5
1,2,4-TRIMETYLBENZENE	2	2	7.5		7-8
1,3-DICHLOROBENZENE	15	13	.8 1.		6.1
1,2-DICHLOROBENZENE	15	2	4.2		1-6.2
1,4-DICHLOROBENZENE	15	1	4.0		1-13
P-ISOPROPYLTOLUENE	2C	2	2.7		3-5
NAPHTHALENE	2C	2	4.2		3-6

A INCLUDES 13 NORTH DIKE RECOVERY WELLS AND 6 SPOIL ROW RECOVERY WALLS.

B GEOMETRIC MEAN INCLUDES ONE-HALF THE DETECTION LIMIT FOR VALUES REPORTED AS NON-DETECTED

C ONLY REPORTED FOR GC/MS ANALYSES (EPA METHOD 624). ALL OTHER ANALYSES PERFORMED BY GC (EPA METHODS 601/602).

SUMMARY OF SEMI-VOLATILA ORGANIC DATAIN GROUNDWATER FOR REPRESENTATIVE AREAS FEBRUARY 9, 1989

CONCENTRATIONS (PPB)

CONSTITUENT/LOCATION	BV-1	SRW-1	SRW-7	HW-1	BC-1
2-METYLNAPTHALENE	30	10	10	10	10
NAPTHALANA	10	11	10	10	10
4-METHYLPHENOL	10	15	10	10	14

PHENOL	10	10	10	10	11

RESPONSIVENESS SUMMARY

THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (EPA) AND THE FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION (FDER) ESTABLISHED A PUBLIC COMMENT PERIOD FROM SEPTEMBER 8, 1989 THROUGH SEPTEMBER 29, 1989 FOR INTERESTED PARTIES TO COMMENT ON EPA'S AND FDERS' PROPOSED REMEDIAL ACTION PLAN (PRAP) FOR THE SYDNEY MINE SLUDGE PONDS SITE (SYDNEY). A PUBLIC MEETING WAS CONDUCTED BY EPA ON WEDNESDAY, SEPTEMBER 13, 1989. THE PUBLIC MEETING WAS HELD AT THE BRANDON RECREATION CENTER IN BRANDON, FLORIDA. THE MEETING PRESENTED THE STUDIES UNDERTAKEN AND THE PREFERRED REMEDIAL ALTERNATIVE FOR THE SITE.

A RESPONSIVENESS SUMMARY IS REQUIRED BY SUPERFUND POLICY TO PROVIDE A SUMMARY OF CITIZEN COMMENTS AND CONCERNS ABOUT THE SITE, AS RAISED DURING THE PUBLIC COMMENT PERIOD, AND THE RESPONSES TO THOSE CONCERNS. ALL COMMENTS SUMMARIZED IN THIS DOCUMENT HAVE BEEN FACTORED IN TO THE FINAL DECISION OF THE PREFERRED ALTERNATIVE FOR CLEANUP OF THE SYDNEY SITE.

I. OVERVIEW: THIS SECTION DISCUSSES THE RECOMMENDED ALTERNATIVE FOR REMEDIAL ACTION AND THE PUBLIC REACTION TO THIS ALTERNATIVE. ACTION AND THE PUBLIC REACTION TO THIS ALTERNATIVE.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS: THIS SECTION PROVIDES A BRIEF HISTORY OF COMMUNITY INTEREST AND CONCERNS REGARDING THE SYDNEY SITE.

III.SUMMARY OF MAJOR QUESTIONS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA'S OR FDER'S RESPONSES: THIS SECTION PRESENTS BOTH ORAL AND WRITTEN COMMENTS SUBMITTED DURING THE PUBLIC COMMENT PERIOD, AND PROVIDES RESPONSES TO THESE COMMENTS.

IV. REMAINING CONCERNS: THIS SECTION DISCUSSES COMMUNITY CONCERNS THAT EPA SHOULD BE AWARE OF IN DESIGN AND IMPLEMENTATION OF THE REMEDY.

I. OVERVIEW:

THE PREFERRED REMEDIAL ALTERNATIVE WAS PRESENTED TO THE PUBLIC IN A PUBLIC MEETING HELD ON SEPTEMBER 13, 1989. THE RECOMMENDED ALTERNATIVE FOR REMEDIATION OF THE GROUND WATER IS PRESENTED IN THE RECORD OF DECISION (ROD). THE MAJOR COMPONENTS OF THE RECOMMENDED ALTERNATIVE INCLUDE:

- CONTINUED OPERATION OF THE EXISTING GROUND WATER RECOVERY AND TREATMENT SYSTEM;
- CONTINUED MONITORING (SAMPLING AND ANALYSIS) OF THE GROUND WATER;
- EVALUATION AND MODIFICATION, IF NECESSARY, OF THE EXISTING GROUND WATER RECOVERY AND TREATMENT SYSTEM TO IMPROVE THE EFFECTIVENESS AND EFFICIENCY.

THE COMMUNITY, IN GENERAL, FAVORS THE SELECTION OF THE RECOMMENDED ALTERNATIVE.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERN

THE BRANDON COMMUNITY AND HILLSBOROUGH COUNTY HAVE BEEN AWARE OF THE CONTAMINATION PROBLEM AT SYDNEY SITE FOR SEVERAL YEARS. SINCE 1982, THE HILLSBOROUGH COUNTY DEPARTMENT OF PUBLIC UTILITIES HAS PERFORMED VOLUNTARY REMEDIAL ACTIONS AT THE SITE AND HAS CONTINUED TO INVOLVE THE COMMUNITY IN THEIR ACTIONS.

EPA CONDUCTED A PUBLIC MEETING ON SEPTEMBER 13, 1989. THE PURPOSE OF THIS MEETING WAS TO PRESENT THE RECOMMENDATIONS OF EPA AND FDER FOR THE REMAINING REMEDIAL ACTIONS NEEDED TO COMPLETE THE SITE CLEANUP. ADDITIONALLY, THE PURPOSE OF THIS MEETING WAS TO ACCEPT QUESTIONS AND COMMENTS FROM THE PUBLIC ON THE SITE AND ITS CLEANUP. AT THIS MEETING, THE KEY ISSUE IDENTIFIED WAS:

PUBLIC NOTICE: THE PUBLIC WANTED TO BETTER INFORMED OF PUBLIC MEETINGS AND SITE ACTIVITIES.

III. SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA'S OR FDER'S RESPONSES:

1) ONE ATTENDEE INQUIRED ABOUT HOW MANY PEOPLE FROM THE PUBLIC WERE IN ATTENDANCE AT THE PUBLIC MEETING.

EPA RESPONSE: A TOTAL OF TWELVE (12) PEOPLE ATTENDED THE PUBLIC MEETING. ADDITIONALLY, FIVE (5) PEOPLE FROM EPA ATTENDED.

2) ONE ATTENDEE EXPRESSED CONCERN ABOUT THE METHOD USED TO INFORM THE PUBLIC ABOUT THE PUBLIC MEETING AND FELT THAT ADEQUATE NOTICE HAD NOT BEEN GIVEN.

EPA RESPONSE: ON SEPTEMBER, 6 1989, EPA SENT THE SYDNEY SITE PROPOSED PLAN TO ALL NAMES ON THE SITE MAILING LIST. EPA ALSO PUT OUT A PRESS RELEASE AND A PUBLIC NOTICE PRIOR TO THE PUBLIC MEETING. EPA AGREES THAT THIS WAS SHORTER NOTICE THAN DESIRABLE; HOWEVER, THE PUBLIC COMMENT PERIOD WAS SCHEDULED TO REMAIN OPEN UNTIL SEPTEMBER 29, 1989. THIS SCHEDULE PROVIDED PLENTY OF TIME FOR THE PUBLIC TO SUBMIT COMMENTS.

3) ONE ATTENDEE INQUIRED HOW CLOSE CONTAMINATED GROUND WATER IS TO THE HAWTHORN FORMATION AND HOW ALTERNATIVES 2 AND 3 STOP THE MIGRATION OF THE CONTAMINANTS.

EPA RESPONSE: THE SITE HAS BEEN CONSIDERABLY DISTURBED BY THE PAST MINING ACTIVITIES; THEREFORE, TAILING SANDS ARE OVERLYING THE AQUIFERS. THERE HAS BEEN SOME CONTAMINATION DETECTED IN THE TAILING SANDS AND IN THE UPPER MINE ZONE OF THE SITE. CONTAMINATION HAS NOT BEEN DETECTED IN THE HAWTHORN FORMATION; HOWEVER, CONFINING LAYERS DO NOT COMPLETELY CROSS THE MINED ZONE. ALTERNATIVES 2 AND 3 BOTH RECOMMEND CONTINUATION OF THE ONGOING GROUND-WATER RECOVERY AND TREATMENT SYSTEM. THE GOAL OF THE SYSTEM IS TO REDUCE THE POTENTIAL FOR MIGRATION OF CONTAMINANTS TO THE HAWTHORN FORMATION BY DRAWING THE CONTAMINANTS TO THE SURFACE FOR TREATMENT.

4) ONE ATTENDEE INQUIRED ABOUT THE DIRECTION OF PERCHED GROUND-WATER FLOW IN THE AREA OF THE SITE.

EPA RESPONSE: THE PRIMARY DIRECTIONS OF PERCHED GROUND-WATER MOVEMENT ARE NORTH, NORTHWEST, AND EAST.

5) ONE ATTENDEE INQUIRED HOW FAR IS THE WORST PART OF THE CONTAMINATION.

EPA RESPONSE: THE CONTAMINATION EXTENDS APPROXIMATELY 400 FEET FROM THE SITE.

6) ONE ATTENDEE ASKED WHO ARE THE POTENTIALLY RESPONSIBLE PARTIES (PRPS) AND IF LEGAL ACTION COULD BE TAKEN TO RECOVER SITE COSTS FROM THE PRPS.

EPA RESPONSE: APPROXIMATELY FIFTY (50) ENTITIES HAVE BEEN IDENTIFIED AS PRPS WHICH INCLUDE CURRENT OWNERS AND OPERATORS, FORMER OWNERS AND OPERATORS, GENERATORS OF WASTE WHICH WAS BROUGHT TO THE SITE, AND TRANSPORTERS WHO ARRANGED FOR THE TRANSPORT OF WASTE OR DIRECTED THAT WASTE BE

TAKEN TO THE SITE. SINCE JUNE 1, 1989, FIVE (5) PRPS HAVE BEEN UNDER A 106 UNILATERAL ORDER TO OPERATE AND MAINTAIN THE EXISTING TREATMENT SYSTEM AND SAMPLING PROGRAM. THREE PRPS ARE COMPLYING WITH THE ORDER AND TWO ARE IN VIOLATION OF THE ORDER. FROM 1982 UNTIL JUNE 1, 1989, HILLSBOROUGH COUNTY VOLUNTARILY PURSUED CLEANUP OF THE SITE AND HAS THE RIGHT TO TAKE LEGAL ACTION AGAINST PRPS TO RECOVER THEIR COSTS.

7) ONE ATTENDEE INQUIRED IF EPA IS PURSUING ACTION AGAINST THE TWO PRPS WHO ARE IN VIOLATION OF THE 106 UNILATERAL ORDER.

EPA RESPONSE: YES.

8) ONE ATTENDEE INQUIRED ABOUT KEROSENE THAT WAS SPILLED AT THE PHOSPHATE MINES AND IF WE CAN REQUIRE THE PAST OWNER, AMERICAN CYANAMID CORPORATION, TO CLEAN UP THE SPILL.

EPA RESPONSE: THE EPA TECHNICALLY REVIEWS CONCENTRATED SOURCES AT SITES FOR INCLUSION ON THE NATIONAL PRIORITIES LIST (NPL) AND FOR REMEDIAL ACTION. THE IDENTIFIED THREAT AT THE SYDNEY SITE WAS THE HEAVILY CONCENTRATED WASTE AT THE DISPOSAL SITE, NOT THE ALLEGED KEROSENE SPILL. PRESENTLY, EPA'S FOCUS IS THE CLEANUP OF A 9.5 ACRE FORMER WASTE DISPOSAL AREA WHICH IS LOCATED ON THE 1,700 ACRE FORMER PHOSPHATE MINING SITE. AMERICAN CYANAMID IS A PRP IN CONNECTION WITH THE DISPOSAL AREA AND IS CONSIDERED PART OF THE FIFTY (50) PRPS PREVIOUSLY MENTIONED.

9) ONE ATTENDEE INQUIRED ABOUT WHO IS NOW OPERATING THE GROUND-WATER RECOVERY AND TREATMENT SYSTEM AT THE SITE.

EPA RESPONSE: AN ENVIRONMENTAL CONSULTING FIRM, CH2M HILL, IS PRESENTLY OPERATING THE TREATMENT SYSTEM UNDER CONTRACT WITH THE PRPS. THIS IS THE SAME CONTRACTOR WHO INSTALLED AND OPERATED THE SYSTEM FOR THE COUNTY. THEREFORE, THE SAME COMPANY IS DOING THE WORK BUT THE COST IS NO LONGER BEING PAID BY THE COUNTY.

10) ONE ATTENDEE INQUIRED WHAT IS THE MOST DANGEROUS CONTAMINANT THAT WAS FOUND AT THE SITE.

EPA RESPONSE: THE MOST COMMON CONTAMINANT FOUND AT THE SITE IS THE CARCINOGEN, BENZENE. FROM A PUBLIC HEALTH POINT OF VIEW, THERE WERE A NUMBER OF CONTAMINANTS FOUND AT THE SITE THAT WOULD BE CONSIDERED HARMFUL.

11) ONE ATTENDEE INQUIRED IF WASTE IS NO LONGER BEING PLACED AT THE SITE, THEN WHERE IS IT BEING PLACED.

EPA RESPONSE: OPERATING FACILITIES ARE REGULATED UNDER THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) OF 1976 AND ITS LATER AMENDMENTS. RCRA REQUIRES THAT THESE TYPES OF WASTES BE DISPOSED OF PROPERLY WITH ONE OPTION BEING DEPOSITION AT A HAZARDOUS WASTE DISPOSAL AREA. THERE ARE NO HAZARDOUS WASTE DISPOSAL AREAS IN FLORIDA; THEREFORE, THE WASTE MUST BE SHIPPED OUT OF THE STATE TO HAZARDOUS WASTE DISPOSAL AREAS IN OTHER STATES.

IV. REMAINING CONCERNS:

THE COMMUNITY'S CONCERNS SURROUNDING THE SYDNEY SITE WILL BE ADDRESSED IN THE FOLLOWING AREAS: INCORPORATION OF COMMENTS/SUGGESTIONS IN THE REMEDIAL DESIGN AND REMEDIAL ACTION; AND COMMUNITY RELATIONS SUPPORT THROUGHOUT THE REMAINING PHASES OF THIS PROJECT.

COMMUNITY RELATIONS SHOULD CONSIST OF MAKING AVAILABLE FINAL DOCUMENTS IN A TIMELY MANNER, TO THE LOCAL REPOSITORY, AND ISSUANCE OF FACT SHEETS TO THOSE ON THE MAILING LIST TO PROVIDE THE COMMUNITY WITH PROJECT PROGRESS AND A SCHEDULE OF EVENTS. THE COMMUNITY WILL BE MADE AWARE OF ANY PRINCIPAL DESIGN CHANGES MADE DURING THE PROJECT. AT ANY TIME DURING REMEDIAL DESIGN OR

REMEDIAL ACTION, IF NEW INFORMATION IS REVEALED THAT COULD AFFECT THE IMPLEMENTATION OF THE REMEDY, OR, IF THE REMEDY FAILS TO ACHIEVE THE NECESSARY DESIGN CRITERIA, THE RECORD OF DECISION MAY BE REVISED TO INCORPORATE NEW TECHNOLOGY THAT WILL ATTAIN THE NECESSARY PERFORMANCE CRITERIA.

COMMUNITY RELATIONS ACTIVITIES WILL BE AN ACTIVE ASPECT OF THE REMAINING PHASES OF THIS PROJECT.